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Captain  
P. F. Harrington



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general scheme can ignore the importance of the study of every possible movement and formation which it is in the power of a hostile fleet to take either offensively or defensively. Such study will show that a false move may give the deciding advantage to an opponent, and that the chances of victory are with the side which makes the fewest mistakes. It may seem that this view makes fleet tactics very much like a game of checkers, in which each move on the board has a corresponding move which carries with it an advantage, and that a fleet engagement must be a series of moves and counter-moves. Up to a certain point this is undoubtedly true. The problem is really to deduce rules of movement and counter-movement, under varying conditions, and thus give definiteness to the formulation of the fundamental principles of fleet tactics. After all, the stern test of war may find any theory wanting, but, for all that, a fleet has an immense initial advantage if its officers recognize certain rules as imperative under given conditions. If this is not really feasible, it at least reduces the necessity of signaling to a minimum, and that is much to be desired.

As applied to troops or large masses made up of different arms, the term grand tactics is generally accepted as meaning the handling of an army in the presence or in the immediate neighborhood of an enemy. When applied to small bodies or single arms, such as cavalry, artillery, or infantry, it is called minor tactics. A fleet being made up of vessels of various types and classes, it may be said that in considering the handling of ships in the line of battle as here advocated, and to which this paper is restricted, we are really dealing with minor naval tactics. One must be very bold indeed to propose a scheme of grand naval tactics embracing the details for manœuvring a great fleet made up of battleships, rams, cruisers, gunboats, colliers, supply ships, tenders, scouts, torpedo cruisers, torpedo boats, torpedo-dépôt ships, repair ships, and sometimes troop ships—in fact, a fleet of ships comprising the line of battle with auxiliaries and *impedimenta*—yet some one must undertake it some day and execute it somehow.

#### TACTICAL CONSIDERATIONS.

The study of naval tactics has not kept pace with the advance in *materiel*, and if we can satisfactorily outline the principles

which should govern the vessels in the line of battle we shall have made a great step towards the solution of the other questions involved in grand tactics.

Tactics must embrace a consideration of fleet manœuvres in the presence of the enemy, both in battle and in retreat. It will simplify this discussion very much if we consider simply battle-ships and cruisers in their relation to the fighting line, and regard our own and not foreign ships as the types under discussion.

The elements which we are called upon to consider are the three weapons of the fighting line, the gun, ram, and torpedo. We must also give consideration to the relative values of speed, quick turning powers, subdivision of the ship, and armored protection, as affecting tactics.

As all men-of-war are built primarily to carry guns, the question of armor protection against gun fire is conversely of prime importance. A modern ship with a protective deck, when broadside to the fire of an enemy *at long range*, is in less danger from the plunging fire of shot and shell striking inboard than if she were bows on, because of the better deflection of the deck, and the fact that when bows on the danger zone is the length of the ship, whereas in broadside it is the breadth. As ships must approach bows on, or else never get within range of one another, the *chances* are equal in hostile squadrons in the matter of this danger from plunging fire at long distance, but the advantage is with the fleet which brings the greater number of *heavy* guns to bear. The target being smaller in the bow presentation, and the chances of hitting at long distances not so great, this phase of the armor question takes on another view when we consider that at close range the above conditions are reversed in ships of the line; for a battle-ship of to-day *at close range* is defensively stronger in bow presentation than in any other, for her deflective deck is not threatened by plunging fire, and her armor offers then its least area, best deflective angle, and its greatest concentration. Importance is here given to plunging fire because the vital parts of a ship are below the protective deck, and as long as these vitals are uninjured it would seem impossible under normal conditions to annihilate or place a ship out of action by gun fire alone. Destruction is the function of the torpedo and the ram. Speed, turning power, and great subdivision are



the defensive means by which these dangers are minimized. In fleet engagements, gun fire is the necessary preliminary to the use of the other two weapons, the ram and the torpedo.

Once in the range of the enemy's guns in a fleet engagement, questions of speed and of turning power are important in the ability given, by superiority in these respects, to take and maintain a position of advantage, or to get out of a position of disadvantage. Individually, they imply ability to ram or avoid ramming, but in fleet engagements it must always be borne in mind that the tactics of the fleet is primarily the tactics of the gun.

The installment of heavy guns in pairs near the ends of a ship has grown up as an incidental result of a consideration of the distribution of weights, but also through the facts that: 1st, a gun on the middle line of a ship which can be fired across the deck is under most circumstances equivalent to two guns, one on each side; and, 2d, a pair of guns in a single turret can be given the same armor protection on two-thirds the weight required to install them singly. This contributes largely to the increase of armor protection in the bows-on position. It is claimed by some advocates of the ram that this strengthening of the bow presentation of a modern armored ship is in deference to the power of this weapon. At any rate, with steam, ram or no ram, the approach to an enemy must necessarily be bows on whatever the ships have been designed for, and clearly we will get very much adrift in the discussion if we fail to realize how the modern changes in ship construction have necessarily entailed changes in the sailing frigate tactics of the days of Paul Hoste and Clerk. The danger from an old-time raking fire at close quarters is now changed into a position defensively of advantage. The supreme object in early days was the close-hauled line ahead (column) with the weather gauge—close hauled (or a course near the wind) because this was the only way to keep the advantage, and the weather gauge, because the position to windward gave the power to choose the time and distance for the attack, and gave the disadvantage of smoke to the enemy. Column being safe and easy to maintain, it was natural that broadside fire should be all-important, particularly as the form of the ship and the details of construction practically made bow and stern fire inconsiderable at best. It thus came about, in the sailing-ship days, that *guns* were in line only when ships were in column, but this is only one



phase of the question now. With steam has returned the old weapon of the galley period, the ram, and with modern ship construction heavy bow and stern fire are possible. Modern conditions demand modern tactics.

Bow fire is now a considerable factor; the ram has its subsidiary tactics; armor has nullified the danger from raking fire at close quarters; the torpedo has made it dangerous to fight at close quarters; smokeless powder and high speed, using any powders, have minimized the embarrassments of smoke in the leeward position; and elaborate subdivision in ships tends to prolong and increase the difficulties of the destruction of ships by either the gun, the ram, or the torpedo.

In outlining a modern scheme of minor naval tactics of ships in the line of battle, it will be well to first inquire what class of ships should compose the fighting line. As the battle-ships or coast-defense vessels must be accompanied by scouts, cruisers, and possibly by rams (if this type of ship is persisted in), the fighting line must embrace all of these types. Ignoring the question of the *impedimenta*, and endeavoring to keep in mind clearly that only the ships built fundamentally for fighting are under consideration, the formations and dispositions chosen for battle should assign the brunt of the fighting to the armored ships, and leave the rams and protected and partially protected cruisers either in the second line or in the reserve, close at hand, ready to be called into action and relying on their speed and handiness to avoid dangerous contact, except when supported by the heavy ships. All this may sound vague, but will be treated in detail later.

Before taking up the question of what formations are best for attack or defense under varying conditions, to prevent the writer from being convicted of error on a misunderstanding of terms, to give definite and technical value to statements, and to limit the discussion to the real issues of the problem, it will be absolutely necessary to give a few definitions taken from the standard works on naval tactics as accepted in this country.

#### DEFINITIONS.

1. In army tactics the *strategic front* is the line joining the actual positions occupied by the masses of an army. In naval

tactics it may be taken to represent the breadth, or sea room, occupied from one extreme flank to the other, measured at right angles to the line of bearing of the enemy. The depth of a formation is the distance from front to rear.

2. Captain Hoff, in "Elementary Naval Tactics," says, "Fighting formations all come within one of the four following categories:

- (a) Narrow front—great depth.
- (b) Extended front—slight depth.
- (c) Front and depth equal.
- (d) Groups."

Tacticians have given us the terms *direct* and *rectangular* as applying to fleet movements.

3. By *direct* movements vessels keep within a certain number of points of the original course and reach their new position in a change of formation practically at will, though really, in our navy, by prescribed rules as to variations in helm and speed, and with an oblique limited to three points from the original course. As most direct movements are made by obliquing, it would be quite as accurate to call them oblique movements, although, under any name, it should be noted that from the time the ships break the old formation until the new one is completed they are in no formation at all, and collisions are liable to occur unless great precautions are taken. The real theory of direct movements is that the ships always present their rams to the enemy.

4. By *rectangular* movements a fleet theoretically goes from one formation to another by a series of simultaneous and successive movements, in which each ship performs the same evolution at undiminished speed, and in which the course and distance passed over are ultimately the same for each vessel. As some rectangular movements are  $45^\circ$  instead of  $90^\circ$ , it would be just as accurate to call them either angular or successive movements, but, under any name, in manœuvring in the presence of the enemy, this method has the apparent drawback that, by it, broadsides are exposed to the enemy's line of rams.

The direct (oblique) method suffers by comparison with the rectangular (angular or successive) method, as will be seen by the following comparison taken from Hoff's "Elementary Naval Tactics": "If there was a force of ships in column, and line was directed to be formed, the direct evolution with eight ships and



at a standard speed of eleven knots would only be completed two miles from where the evolution began, and would take twenty minutes. If the rectangular method was used, the evolution would be accomplished in eleven minutes, and only eight hundred feet ahead of the point where the evolution started." If reserve speed were used in the direct method the evolution would be performed more quickly, but as this is equally true of the rectangular, it does not vitiate the illustration.

5. Some tacticians assert that once in the presence of the enemy, in any formation, simultaneous movements, that is, change of heading of all ships simultaneously, are the only ones that can be used in action. In this view, naval tactics consist in selecting some strong offensive or defensive formation, group or otherwise, and sticking to it. It is the standard argument of most advocates of either symmetrical or unsymmetrical group formations. But it is in the main simpler to regard group formations as a separate question, discussing it as such, and *to consider simultaneous movements as one phase of the rectangular*. This separation of the issues clearly between the direct and rectangular movements, without complicating it with the group question, is important and necessary, and will here be followed.

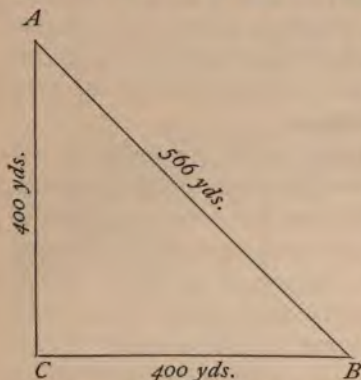
The following illustration will show the embarrassment of using direct in combination with rectangular movements:

Distance between vessels being in our present tactics 400 yards in line or column, and 566 yards in échelon, if there are six vessels in échelon and either line or column is formed by a half-turn, all vessels must readjust to 400 yards on the leader or guide, requiring the rear, or off guide vessel, to regain 830 yards. Being in line or column, if vessels half-turn, échelon is formed, but the distance is 400 yards instead of 566 yards. If order is now given forward into line, the distance would only be (in line) 283 yards. These readjustments are confusing, and should not be thought of in the face of the enemy.

To point out some practical embarrassments with direct movements *per se* with distance of 400 yards, let us take the extreme case, the Columbia, or Minneapolis, and state the case in every way in the extreme.

Let us assume the Minneapolis and Columbia as being in section in line and signal made to form column, left vessel forward, right vessel left oblique. Let us further assume that the

putting over of the helm does not slow the right vessel appreciably. If the oblique is made four points, the distance to be traversed by one ship is relatively 566 yards to the other's 400



yards. On the completion of the manœuvre, the distance from center of *A* to center of *C* is only  $566 - 400 = 166$  yards or 498 feet. As each ship is 412 feet long, and distance is measured from center to center, it will be seen that from the stern of the Minneapolis to the bow of the Columbia there will be just 86 feet to spare.

Our present tactics prescribes that *B* shall slow to two-thirds speed as she puts her helm over to oblique 3 points, but as, even if you *stop* the engines, a ship carries her way with her original speed some four ship's lengths, it happens practically that *B* comes uncomfortably near *A*, and, where there are four or six other ships, the error is cumulative. It takes a very great amount of drill to make the execution of direct methods other than ragged and unsatisfactory. The fact is, the standard distance should vary to suit the particular division, squadron, or fleet, but should not vary for any particular formation. As massed formations require that ships should be as close to one another as feasible, this distance should be what is required to manœuvre with safety and *no more*.

If it is necessary to form *échelon* to the front or rear by the direct method, vessels should oblique in to standard distance from center to center, because you are then in position to form line or column, and you have regained distance while changing line of bearing. In other words you have minimized the evil of changing bearing in the face of the enemy by readjusting all derangements. Conversely, if in *échelon* and line is formed to the front, ships should open out to standard distance as they advance to come in line.

The advantages of rectangular methods are as follows:

(a) Each ship executes simultaneously or successively, identically the *same* manœuvre, at *same* speed, and with *same* effective helm.



(b) The wake of the next ahead is always clearly marked on the surface of the water, whether or not the ship is visible, so that following is easy even in thick smoke. By towing a sentinel astern on a distance line, all danger of collision is minimized.

(c) Ships are the least possible time out of a distinct formation, and are always on one or, at most, two definite lines of bearing. The change of bearing is successive and definite, so that there is no uncertainty, and no danger arising from uncertainty.

(d) Rectangular movements require fewer signals than direct movements, and, in the absence of signals, most of them can be executed by following the movements of the leader, or flagship.

(e) This method is the best for manœuvring mixed types of ships of different tactical values.

(f) It permits of massed formations with the least manœuvring area for safety. The direct movements are dangerous in smoke, bring a great strain on the mind of the commanding officer, and make the next astern often of more danger than the enemy.

Some direct movements, such as *échelon* from line (and *conversely*) are, however, performed more quickly than by the rectangular, and besides do not lose sea room on the flank; but from actual trial in twelve tactical games at the War College the past summer, war conditions being simulated as nearly as practicable, 84 per cent. of all manœuvres were simultaneous or successive *changes of direction* principally in column, while only 16 per cent. were devoted to all other formations (such as changing front, forming double column, *échelon*, etc.).

After all, the limitation of tactical manœuvres to certain definite methods limits also the number of signals for battle purposes, and this is much to be desired.

6. Foreign books on tactics, on which all of our own are based, use terms to express formations which we must either use, or else state the equivalent for, in order to give definiteness to statements.

*Column* is here taken to mean "line ahead." Abroad, a column is any distinct group in any formation.

"Line abreast" is simply *line*.

"Bow" or "quarter line" is *single échelon*.

"Double bow" or "double quarter line" is *double échelon*.

7. The word *standard*, as applied to helm, speed, or turning circles, in our navy, implies that to make all ships of a fleet homo-

geneous, or of equal value tactically, all must conform to the capabilities of, and perform the same as the least effective ship in the fleet. Hence such terms as "standard full speed," "standard helm," etc.

#### TACTICAL PROPOSITIONS.

Definitions having been given in order to insure accuracy of statement, the point of view and the guiding principles on which the rules of action are based should be clearly stated.

The object of all manœuvres in a fleet action is to get and keep the enemy within effective range; to blank some of his gun fire by getting a superior position; to hold an advantage gained, or, losing it, to manœuvre for a fresh one; to avoid waste of ammunition; to concentrate fire on an exposed flank of the enemy in order to reduce the tactical efficiency of all ships by crippling one or more; but, of all things, at all times, to keep up an effective and destructive fire.

To expand this general proposition, the following special ones are here enunciated as the principles on which any scheme of steam fleet battle tactics must be developed. They may not all be incontrovertible. On the contrary, they may be unconsciously inaccurate and only true in part. If so, they at least serve the purpose of forming a basis for discussion.

1st. As many methods of interior communication should be available in each ship as will enable her commanding officer to handle her effectively.

The four things which he should have under his complete control are (1) the speed, (2) the course, (3) the gun fire, and (4) the torpedo fire. The things which he ought to know at all times, or be able to obtain by proper interior communication, are (1) the helm angle, (2) the revolutions of the engines, (3) the range of the enemy, (4) the distance and bearing of the guide in squadron, (5) the readiness of each division of the battery to fire, (6) the readiness of each torpedo-tube to fire, (7) the intactness of the hull, and (8) the heeling of the ship.

2d. Signaling between ships is merely a means to an end, and, while this end can be attained with the minimum of signaling by perfecting the rules of tactics, yet every known method of signaling between ships should be available for battle, so that if one



fails another may be used. The virtue is not so much in any *one* method as it is in having many.

This includes reeving of numerous halliards, developing shape signaling, adopting some form of semaphore, perfecting day fireworks, using some form of siren, or whistle, with cone reflector, and some form of steam jet in the armored tops to make visible steam puffs, etc.

3d. Protecting shields and armored fighting stations at several points should be provided for the admiral, the captain, the signalmen, and the immediate officers liable to succeed to the command in case of accident to the commanding officer.

These latter, the executive and navigator, should be separated somewhat to avoid danger of being killed or injured simultaneously, and should keep the captain posted as to the progress of events and as to signals made.

4th. Every known device for obtaining the range of the enemy and for aiding in keeping position in formation should be available. Range-finders, sextants, trial shots, telemeters, stadimeters, and estimating distances should be resorted to as occasion demands.

5th. Everything should be done that is possible to take certain details off of the mind of the commanding officer in action. Battle signals should be few and simple, corresponding to few and well-understood movements. Tactical rules should be established whereby, in the absence of signals, a certain logical and definite course of action may be pursued. Gun fire and torpedo fire should be regulated by hard and fast rules, so that those in charge may act intelligently, but both should be under the control of the commanding officer, *to avoid waste and to prevent injuring friends*. The ram is absolutely under his control, because ramming is a question of helm and speed, and on him alone rests the awful responsibility for risking the use of this, the most dreadful weapon known to modern warfare.

6th. As far as practicable, all movements during battle should be rectangular, at standard speed, standard distance, and with standard helm.

7th. Tactical distance, here defined as *standard* distance, should be the radius of the standard turning circle of the particular fleet or squadron, and not an arbitrary number of yards for all squadrons.

8th. The speed in battle should be standard fast speed. Stan-

dard full speed and individual full speed should be reserved for emergencies.

Speed is not a weapon. Superior speed is the means by which one of the three weapons of the line of battle may attain and keep a superior position or secure an advantage. A reserve speed enables a fleet to seize a given advantage when it offers, or get out of a position of disadvantage.

9th. In a fleet action the tactics of the torpedo and the ram are incidental to the tactics of the gun, which is the weapon of prime importance.

This assertion is too fundamental to admit of discussion in the limits of this paper.

10th. Tactical rules apply only to a given relation, temporary or otherwise, between two opposing fleets. An advantage gained by a skilled manœuvre may be lost by a counter-manœuvre of the enemy, and can only be held, or regained, by either superior speed or superior skill.

11th. Direct movements in changing formations serve an occasional purpose only, and their use should be limited to bare necessity.

12th. If the direct method of forming *échelon* is used for any purpose, ships should be required to close up to standard distance from center to center, in order to be ready, if necessary, for a change of formation by the rectangular method.

13th. Any long extended order, whether line or column, is fundamentally weak (Captain H. C. Taylor, U. S. Navy).

14th. There is nothing in modern gun fire to deter an admiral from adopting any formation however compact for his advance upon an enemy (same authority, Captain Taylor).

15th. Massed formations are fatal to passive defense, but of the utmost value for vigorous offense (same authority).

16th. Group formations for battle, as distinguished from massed formations, should be limited in use to giving mutual support at critical times, otherwise some form of line, column, or *échelon* should be the formation.

To justify the arrangement of ships in groups, there must be some advantage attained by it in gun fire, ramming, or in mutual support. All group formations which are not flexible enough to admit of readily passing into simpler formation, such as groups in column, line, or *échelon*, should be condemned at once. Most



of those which have been proposed have been of three or four vessels disposed at the angles of triangles or parallelograms, it being claimed that signals are thus seen more plainly, the vessels give mutual support, and changes of direction simultaneously do not alter the figure. The groups are formed in line of groups, column of groups, and échelon of groups, so it is important to inquire whether groups thus arranged are more advantageous than single ships. In the first place, it is utterly outside of the discussion to claim that groups are a good cruising formation. We are considering battle tactics. We can dispose of the group of four at once by considering it made up of two groups of two each, so we will consider two against three. The *péloton* is the favorite three group. Ships in line, column, or échelon of *pélotons*, take up much more sea room and are less compact by one ship for every group than a formation in indented line, column, or échelon, of the same strategic front. If nothing else were needed, this defect of want of compactness would condemn it. Captain Hoff points out most conclusively in all he has written on the subject, that the section of two vessels is the group of greatest mutual support, "where, in line, the gun and ram of one support the gun and ram of the other; and, when formed in column of sections, the guns of the leader support the rear vessel, and where the rear vessel supports the leader with its ram." This section of two is flexible. It is always either tentatively formed, or in position to be formed by a slight movement of the helm, or a change of speed. For instance, in double line, if the second line closes up to standard distance on the first, the formation is really "column of sections disposed in line abreast." In indented line, each ship which is to the rear, by moving its helm, can sheer into the wake of its leader, and we have the same formation as that just stated. Indeed, any other group formation than the section of two ships is a step backwards.

17th. The manœuvring power of a squadron being that of its least efficient ship, tactics should, by judicious formations, aim (a) defensively to preserve the integrity of its units, and (b) offensively to reduce the tactical efficiency of the enemy by concentrating the attack on one or more of the units of his fleet, particularly on the flank, or on a manifestly weak part of his formation.

18th. In manœuvring to concentrate on a part of the enemy's formation, the secondary object of all movements should be to gain an advantage, temporary or otherwise, of your gun fire over that of the enemy by blanking as much of his gun fire as possible.

19th. Concentration may be accomplished by enveloping a portion of the enemy's fleet, but concentration should always be accompanied by constriction and with a full knowledge of its dangers (Captain H. C. Taylor, U. S. N.).

Concentration is either by gun fire or by rams. Neither has much application in the early stages of an action where the manœuvring power is such that gun fire alone will hardly cripple a vessel to a standstill. According to Captain Hoff, concentration by rams means the "causing of a ship attacked to steer a course as divergent as possible from the general course steered by the rest of the ships of the force to which she belongs, and thus cut her off from her consorts."

20th. Echelon is a strong defensive formation, but may be dangerous to the fleet using it, unless superior in speed to the opponent. As a formation for attack, it is too oblique to the line of bearing of the enemy. As a means of concentration of gun fire on the head or rear of a column it is excellent.

If attacked on the flank in the direction of its line of bearing, the fire of all the ships on that bearing is blanked. When thus attacked it is a difficult formation to get out of except by a direct movement, and then the ships interfere with one another's broadside fire just when it is most needed. Echelon is really the compromise between line and column, with the disadvantages of both, for it is as difficult to maintain as line, and not so flexible as column. Vice-Admiral Randolph, R. N., proposes, in *Problems in Naval Tactics*, a sort of line-échelon formation for attack in which the line of bearing is  $17^{\circ}$ . In torpedo-boat tactics abroad, the groups steam in overlapping column, each bearing about  $17^{\circ}$  on the quarter of the other. This is a variation of column towards line. Echelon is really a tentative formation for a special purpose, as illustrated in No. 30. As a continuous battle formation, it has ceased to have many advocates. Therefore, some form of line and some form of column are the remaining ones to be considered.

21st. The reserve, made up of special ships, has its special tactics, not here considered, as they must act independently and manœuvre to avoid action until such time as they may relieve



a weak position, or consummate the advantage obtained by a strong one.

22d. The flagship in a small fleet should be a battle-ship of the heaviest order, to be able to lead when necessary and bear the brunt of the approach in a manœuvre.

23d. The flagship in a large fleet should be an armored cruiser of considerable speed. Her position need not be in the line of battle except when it is to her advantage.

She should be accompanied by a second armored, or a protected, cruiser as a mate, and these two vessels should manœuvre as an independent section, or group of two. They may, or may not, be accompanied by two or more torpedo cruisers to serve as dispatch vessels, and also for defensive purposes, in event of a concentrated attack by the enemy on the flagship. The admiral should be in an armored cruiser, in a large fleet action, because of her speed and protection, and should be independent of the formation, that others may easily see his signals, and to enable him to see as much of the action as possible.

24th. Under average conditions, the best initial formation for the approach to the attack is *line in some form or other*. If the enemy is not in line also, and a charge through is not practicable, column will probably be used until a charge through, line to line, can be forced on the enemy.

This proposition will be argued at length later on.

25th. Line should be limited to a front of eight vessels, as that is the maximum that can be brought into action *and preserve flexibility* enough to pass readily into column.

With twelve ships, in double line, six in each line would be better. If the enemy is in line and presents a broader line, the flanks should be strengthened by a heavy ship in column of section with, and in rear of, each flank ship. Distance between lines in double line should be not more than six cables, that being proper supporting distance and inside the limit of time of loading and firing big guns in a charge through.

26th. Column is historically and logically the strongest formation, but should never be used for the approach to the attack unless the fleet using it has the advantage in speed. Once in the zone of fire, and the charge through not expedient or practicable, column is the safest, best, and most effective formation to go into from line.

27th. Column should always be taken to mean *indented* column, in which ships do not follow exactly in the wake of the next ahead, but a little on the port and starboard quarter, alternately, of each ship.

This minimizes the danger of collision, enables a more compact formation to be maintained, permits signals to be seen to better advantage, places the ram of the mate to better advantage in case of need, and best gives to column all the advantages claimed for it, viz.:

- (a) Column is easiest to keep or to reassemble in.
- (b) It is perfectly flexible, and can, in a few minutes, change to any direction and into other formations.
- (c) Each ship is flanked by the two next astern, which can come up on either side in case of need.
- (d) Ships in column can maintain the same speed.
- (e) By a slight sheer out of line, any or all the weapons—the gun, ram, or torpedo—can be called into play.
- (f) In this formation guns practically are in line.
- (g) The indented column is more *adhesive* and concentrated than direct line ahead (column).

28th. The changes of direction of head of all ships simultaneously, or of head of column in action, should be four points, or multiples of that number.

This enables us to reduce the number of battle signals; it simplifies movements; it adds to the effectiveness of gun fire by not changing direction so often; and it prevents a wavering policy as to converging on the enemy. In rounding the flank or rear of an enemy's formation, an exception to the above will be made in that each will circle and draw in without regard to four points and without the necessity for signals, as hereafter described.

29th. Chase should always be given where opportunity offers, viz., when the enemy offers a stern presentation. Unless he is superior in speed he cannot get room to turn and front you when you are once close in his wake, and you can pick up all stragglers.

30th. A greatly inferior fleet in point of numbers, but possessing a decided advantage in speed, may attack a column with some show of success by the retreat formation in double *échelon*.

31st. A greatly inferior fleet in point of numbers, or in types



of ships, should seek to bring on an engagement, if at all, in narrow waters well known to its officers.

The preceding propositions may all be summed up in the following phrases: 1. Massed formations. 2. Concentration in attack. 3. Reserve speed. 4. Knowledge of plans. 5. Ability to execute them. Further arguments in support of several of the more important propositions will appear in the discussion of the fleet in action.

Until we know a little more about tactics, the most practical method of arriving at sound conclusions is to analyze the gun fire and tactical qualities of the ships we have, and deduce tactics to fit them. We do not know the tactical qualities of many of the newer ships, and it is not good policy to publish the tactical data of those now in commission. Fortunately, gun fire alone gives very conclusive results from its study.

Prof. Alger, U. S. Navy, in a recent lecture at the War College, gave an illustration of the broadside fire of battle-ship No. 5 (Kearsarge), in which it was assumed that a 13-inch gun can be fired once every 5 minutes, an 8-inch once every 2 minutes, a 5-inch R. F. three times in 1 minute, and 4-inch and smaller calibers four times in 1 minute: "We find that of the whole number of projectiles fired in any period of time on one broadside, only six-tenths of 1 per cent. will be 13-inch, 1.6 per cent. of 8-inch, 16.5 per cent. of 5-inch, and 81.3 per cent. of the smaller calibers. In other words, 3-inch armor will keep out at least 81.3 per cent. of all projectiles fired by one battle-ship against another, 6-inch armor will keep out at least 98 per cent., and 12-inch armor at least 99.4 per cent. When we consider the fact that most impacts will not be normal, and that the range will usually be considerable, we may safely say that under any probable future conditions armor of 7-inch thickness will keep out 98 per cent. of the whole number of projectiles fired against it."

This view of gun fire does not of course deal directly with the chances of hitting or with the variation in striking energy at different distances. It is an important phase, but there are others.

At the War College, in the tactical games, the unit of gun fire is the broadside fire of a ship, for a certain period of time, at 2000 yards range. The right ahead or right astern fire of a ship under the same conditions is one-half unit; and the bow and quarter fire, three-quarters of a unit. At 4000 yards the values are one-

fourth the above; at 3000 yards, one-half; and at 1000 yards and less, double. Some re-adjustments of the values assigned to right ahead and bow and quarter fire would seem desirable in the light of the accompanying diagrams, which illustrate the values assigned to the different arcs of fire of various well-known ships in our navy, computed on the basis of the percentage of projectiles thrown in any given time, multiplied by the striking energy, 1st, at 2500 yards, and 2d, at 1000 yards. These distances are chosen because the former is just beyond the effective range of all of the secondary battery, and for the further reason that at this range (2500 yards) the "remaining velocity" of a 6-pdr. is just that of a 1-pdr. at 1000 yards. The dotted line represents the value of a single volley from all the guns bearing in the different arcs. It will be noted that *the lengths of the radii, and not the areas of the sectors*, are the measures of the striking energy on any line of bearing. This comparison of the volleys is a good method in considering all the ships, for it ignores any question of rate of fire, which may vary. The full lines are computed on the basis of the number of smaller projectiles thrown in the interval between the fires of the largest caliber gun carried by each ship. The right-ahead and right-astern fire is represented as a sector, it being assumed that a variation in the course of one or two degrees will be permissible in formations to bring the guns to bear.

It is assumed in the diagrams that a 13-inch gun can fire once every 6 minutes, a 12-inch once every 5, a 10-inch every 3, an 8-inch every 2, a 6-inch every 1, a 5-inch R. F. 5 times a minute, and a 4-inch R. F. and smaller calibers 7 times a minute. The rates of fire of the 5-inch R. F. and smaller calibers may be considered excessive, but are based on actual trial. The 13-inch and 12-inch guns in the British Navy are said to fire once every 2 minutes, and even less is claimed. Why our guns should be so much slower remains to be explained.

In comparing the battery power of different ships, as shown by the heavy lines, it will be noted that, for instance, the period shown for the Indiana is 6 minutes, for the Iowa 5 minutes, for the Maine 3 minutes, for the Minneapolis 2 minutes. A comparison of the Minneapolis with the Brooklyn, in which the interval is 2 minutes in both cases, shows clearly where it is advisable to invest money in the future. The assigning of such a slow rate to the big guns and such a high rate to the rapid-fires



emphasizes, probably unduly, in the Kearsarge, the great importance of rapid-fire guns, but it is doubtful after all if we can emphasize this too much. The Puritan is the most powerful of our monitor type. All other monitors would plot the same way as to arcs of gun fire, but with smaller radii. The Monterey would present one slight variation, in that her after turret guns are 10-inch and her forward 12-inch. The Maine shows the effect of the échelon arrangement of her turrets in the strong port bow and starboard quarter fire. The Iowa's stern fire fits her admirably for the rear vessel in a column. The Kearsarge illustrates that, as usual, in departing boldly from European models, we have achieved a notable success. It is to be hoped that some ship of this type will be named the Alabama, to demonstrate that, while the war is over, we should not fail to remember one of its most important lessons.

This analysis of the gun fire of different types emphasizes clearly the fact that each unit vessel of a class should possess the same tactical qualities and the same distribution of gun fire, and that a continuous programme of ship-building should be at once entered upon in conjunction with a thoroughly renovated system of battle tactics, in which the ships should conform to said tactics. The building now of homogeneous ships of a few definite types, and plenty of them, combined with a clear recognition of our future in this hemisphere, is, as even a purely commercial investment, a sound and wise policy, aside from the manifest duty we owe to the coming generations of Americans in perpetuating our free institutions on this side of the Atlantic.

#### THE FLEET IN ACTION ON THE OPEN SEA.

Having a fleet composed of a certain number of armored ships and a greater number of scouts, protected, and partially protected cruisers, the process by which an action would be brought about with practically an equal force of a worthy enemy would seem to be about as follows:

1st. *Scouting*.—The highest development of the scout would be the improved *St. Louis* merchant type of high speed, great coal capacity, and armored and coal protection to boilers and engines. Her fighting value would be small, possibly, but her capacity for useful work would be in the nature of a revelation. This type

of ship, with an enormous radius of action, would be able to cable or bring in news of the whereabouts of the enemy.

Proceeding in force to look for him, the scouts accompanying the fleet, deployed in extended order, would bring in and transmit by signal the sighting of the enemy in force on a certain bearing, giving such details of his strength and formation as it had been practicable to ascertain. What formation should our fleet at once assume?

2d. *The approach to the attack.*—There is a period of time between the sighting of the enemy and the arrival of the two fleets in the zone of each other's fire which we must carefully study, for on it depends the securing of the first advantage, which often implies that a second will follow if properly managed. During this period the formation to be assumed should be one in which tentatively each ship is in such a position towards the enemy, relatively to her consorts, that her weapons may do effective work at the earliest instant, thereby securing the first advantage. The weapon of great range is the gun. We have seen that "armor of 7-inch thickness will keep out 98 per cent. of the whole number of projectiles fired against it," *at long range*, owing to the fact that impact will not be normal; but we have also seen that a plunging fire of heavy projectiles, striking inboard on the protective deck *in the bows-on position* at long range, possesses the maximum destructive effect which gun fire can produce in *reducing a ship's tactical efficiency*. Therefore, when we ask ourselves in what formation we should approach to the attack, the answer is *that in which the maximum number of heavy guns can be brought to bear at long range; viz., some compound form of line, preferably double line, each line being indented, the heavy ships in the first indented line and the lighter ships in the second indented line, six cables in rear*. This formation is the armed reconnaissance in force preliminary to battle strategy or battle tactics, and in no way commits the fleet to remaining in that formation, because line can at once be changed into column, if desired, as soon as the measure is taken accurately of the enemy's formation and disposition.

In support of indented line formation for the approach to the attack, we may summarize:

(a) It brings all the heavy ships of the first line into the zone of the enemy's fire, and consequently also brings the maximum



number of long-range heavy guns into action *at practically the same moment.*

(b) The second line is protected by the heavy line, and is ready to support it when needed.

(c) It gives a chance to make an armed reconnaissance in force without definitely committing the fleet to any formation.

(d) Indented line can be made compact by using the standard tactical radius for distance from center to center of ships; the group of two is tentatively ready for formation in column of sections; the right-ahead fire of all ships in the first line is unobstructed; the ships in advance in the first line have their broad-on-the-bow fire clear for firing towards the enemy's flanks; and on a simultaneous turn of eight points the line becomes indented column, which is as it should be.

It will be recalled that the flagship, not being in the formation in a large fleet, signals can be seen plainly. In a small fleet the flagship should be on one flank, and should be advanced a ship's length out of line to enable signals to be seen and to act as a general guide.

3d. *The attack.*—It will be a surprise to many to meet with the statement that a charge through, line to line, with the enemy, should be eagerly sought for and tactically striven for. If, in the approach, the enemy is not in line there is no use in remaining long in line, for, if he is in any other formation, column is the best form of attack under most conditions. To remain in line, the enemy being in any other formation, is to invite a concentrated attack on either flank.

Before considering the best method of attacking each separate formation in which we may find the enemy, let us discuss thoroughly the charge through, which is here claimed as the great *desideratum*.

Approaching, line to line, we being in indented line with second indented line six cables in rear, and possibly a third line six cables in rear of that, at 1500 yards from the enemy, or on signal being made, the rear ships of each indented line oblique in one-half point on the quarter of their leaders. This opens a way for the enemy to pass through and removes the danger of a "brush past," or collision bows-on, which is to be equally dreaded by both fleets. If the enemy forms column of sections, in the same way, then the fleets are on equal terms as far as formation is concerned; but if

the line of bearing of B's échelon formation at right angles. After crossing it, A's head of column changes course another four points towards B's squadron, and is then standing on parallel to B's course; the fire of all of B's ships, excepting the leading one (nearest flank), is blanked, while A brings all broadsides to bear in concentration on B's leading (flank) ship. As A's head of column gets well past B's flank, it changes direction eight points, coming in astern of B's ships, and bringing broadside fire to bear against B's stern and quarter fire, then forming line and giving chase by turning eight points towards B, now in retreat.

To illustrate how an adroit tactician may, with an inferior squadron possessing superior speed, attack an enemy's column, suppose A with a few ships in any formation to stand down toward B's column, manœuvring so that he will finally be in line, or double échelon, in retreat, with B's column in chase. A, if in line, can gradually form double échelon, and, by slowing sufficiently, can concentrate on B's leading vessel. Having superior speed, A can avoid action on any terms other than that which is advantageous to him.

To illustrate how to reform after a charge through and immediately give chase, suppose A to have gotten through B's fleet, A being in two or three lines with ships in column of sections disposed in line abreast, eight ships in each line formation: After the rear line gets through (supposing there are three in all), the second and third line go, right wing, head of columns of sections eight points to right, and left wing, head of columns of sections eight points to left. Each wing stands on until clear of the flanks of the first line. (Each wing is in column of four ships.) As soon as clear of the flanks of the first line, each wing of the second and third lines turns simultaneously through eight points, heading away from the first line and towards the enemy, and slows to half-speed. Meanwhile the first line has countermarched by column of sections using port helm, and, standing on at full speed, passes between the wing divisions of the former second and third lines and gives chase to the enemy. As the heavy ships pass, the wing divisions of the other lines successively close in, in the original order, form line, then indented line, and possibly column of sections, according to formation assumed by the heavy ships. It is assumed, in support of this method, that the turn through 16 points is made by the heavy ships better



in column of sections than in any other formation, as there is more sea room, and that the other lines in forming divisions on either flank cover the manœuvre of this line. As the heavy ships stand on, they in turn cover the manœuvres of the supporting lines as they form. Another, and possibly equally good, method is for all columns of sections to countermarch successively, beginning with the first line.

To illustrate the tactics of column to column, standing on in the same direction, we will consider two squadrons, A and B, in single column, with A as the aggressor. There are two conditions to be considered: (a) A faster than B; and (b) A equal in speed to, or slower than B.

(a) A faster than B. A gradually slows and forms double échelon on rear of B's column. If head of B's column turns through 12 or 16 points (countermarches), A, by a simultaneous turn through 8 points, transfers this same formation to concentrate on the head of B's column, turning through *eight points more* in the new (opposite) direction. This is safe enough for A, for, though B is in chase, A can at any time stand on and gain sea room and turn.

(b) A equal in speed to, or slower than B. A slows, and, as each ship brings B's rear ship forward of the beam, it sheers out of column, steering four points towards B so as to come in astern in double échelon formation. If B is faster and draws ahead, A has at least concentrated gun fire as long as possible. As soon as B draws ahead, A forms indented line and continues in chase. A counter-move by B may, on the other hand, make the double échelon formation untenable, as follows: If B's head of column countermarches, or changes direction 12 points, A should at once go into column by a simultaneous change with opposite helm of four points for further wing and twelve points for nearer wing, and then, by head of column the necessary number of points, A comes in astern of B again in line, and can form double échelon once more. It will be observed that in this movement A goes around three sides of a square, or a triangle, according to circumstances, but as column is flexible, it is better than using a direct method.

#### TACTICAL RULES.

Without intending to outline a consistent system of battle tactics made up of movements and counter-movements in attack and

defense, the following tactical rules are offered as suggestive of expansion by inference and by experience into a general scheme. It should be borne in mind that single line and single column, in fact all simple formations, are much more flexible than compound, but that as eight ships are the limit in even compact formations, we are forced to have compound formations if the fleet is large. In selecting the ships to go in the heavy line, the supporting lines, and the reserve, it will be noted that from the nature of things the supporting line or lines should have greater speed than the heavy line, because the latter manœuvres to come between it (or them) and the enemy, and in going from double line into double column and then changing head of double column eight points, the supporting line must use reserve speed. The reserve should be made up of slow ships and ships of special classes, and, protected by torpedo-boats and torpedo-catchers, should shift for itself and manœuvre to give such support as it can. It is better to go into action with fewer homogeneous ships of good speed and tactical qualities than with more ships when one or two are lame ducks. These last would be better off in the reserve. The fighting line should be agile, and should rely on its heels to be able to protect the reserve in a concentrated attack on it by the enemy. By manœuvring ordinarily at fast speed, the full and reserve speed is kept for emergencies.

1st. When the enemy is sighted, form indented line at right angles to his bearing, with heavy ships in the first line, and advance at fast speed.

2d. If he is in line, seek a charge through in column of sections disposed in line abreast. Torpedoes shall not be used. Gun fire of rear ships shall be reserved for volley firing under control of the captain, so as not to injure friends, until an enemy's ship becomes a target close-to, when general action may be had.

3d. In the charge, to reform after passing through, the first line shall turn with port helm by countermarching in column of sections. The supporting lines shall divide by wings to right and left, eight points, till clear of flank of heavy line, then head towards enemy and slow to half-speed. The heavy line, after countermarching, shall proceed at full speed, the supporting lines coming in in rear and adjusting speed and formation to new requirements. (Another good method is for all columns of sections to countermarch successively, beginning with the first line.)



4th. If enemy is in single échelon, stand across the line of bearing of enemy's formation at right angles in column, then change course to come by successive changes of direction of head of column in rear of his formation, and give chase. If in double échelon, proceed in same manner around either flank.

5th. Always give chase when opportunity offers, because your bow presentation is stronger than his stern presentation; you thus have the advantage in your fire, and while you are in his wake he dares not turn.

6th. In the attack on the head of a column by double échelon, the rear ships of the formation should open out clear of the wake of the enemy's rear ship in column to avoid torpedoes which may be dropped by him in his wake.

7th. The leading ship in a column should never attempt to ram unless it is unavoidable or to prevent being rammed, as it will throw the column into confusion.

8th. If the enemy's column attempts to cut through your column at nearly right angles, either stand on and trust to the rear ships being able to ram or torpedo the enemy; or else (a) turn simultaneously through the necessary number of points to head on same course as enemy, and gradually form double échelon to concentrate; or (b) turn simultaneously as stated and double on head of enemy's column by flank ships forming column by slowing successively.

9th. Gun fire being of prime importance, frequent changes of direction should be avoided as being disconcerting to gun fire. If a fleet is skilled in volley firing, these changes may be made simultaneously to bring certain heavy guns to bear at intervals. The increasing value of rapid-fire guns has, however, weakened the former value of concentrated volley or broadside firing.

10th. Always use rectangular in preference to direct method, unless to serve a special purpose.

As before stated, these rules are founded on the tactical propositions previously enunciated, and do not represent a complete scheme of tactics. One could, and should, be worked out, however, by one or more drill squadrons, or a fleet of steam launches, such as at the Naval Academy, where the practice will undoubtedly develop some flaws in the theories. A set of tactical rules should include both what to do and what not to do. Battle signals will probably be found to be limited to somewhere between

50 and 75. It may be possible, however, to reduce the number to 35 by formulating rules.

The Naval War College, at Newport, R. I., is accomplishing a great work in formulating the theories of naval warfare. The tactical work should be supplemented by practical exercises afloat. Squadron drill in tactics consists more in studying formations in relation to gun fire with actual target practice, than in making dress parade formations according to inaccurate drawings, based on an inconsistent text which nowhere gives an intelligible idea of the why or wherefore of any formation. Our books on tactics are primers; our signal books are a monument to those who do not go to sea; and the Naval War College, like the proverbial prophet without honor in his own country, is really about our only hope of inspiration in case of that form of national trouble for which alone the Navy has any excuse for existing.

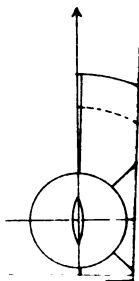
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#### DISCUSSION.

Commander C. F. GOODRICH, U. S. N.—The prize essay of this year is a valuable contribution to the literature of naval tactics, quite as much for what it does not attempt as for its positive suggestions.

The form which an action will assume, after once begun, is entirely problematical, although, to my mind at least, it appears highly probable that a general *mêlée* is an inevitable sequence of the "dash through." If an admiral will, following Nelson's example, take his captains into his confidence, explain his views, invite free discussion, and lay down the result of these conferences in a number of clearly-defined general schemes to cover such actual conditions as are likely to arise, he may be sure that, when the battle has passed beyond the preliminary stage of the attack, when its smoke and confusion have put an end to signalling, and when the casualties, which must be expected, have occurred to prevent further concerted action, he will be only less well served than if he were on board each ship directing its individual manœuvres. For the disorganizing reasons hinted at, it appears wise to consider more particularly the approach, and only to take up the succeeding events as contingent upon emerging from the initial brush with tactical powers reasonably unimpaired.

I am quite at one with the lecturer in believing that, within certain limits, the fewer and the simpler the evolutions for battle the better. Formations offering theoretical advantages, no matter how great, should be ruthlessly discarded if their maintenance makes too heavy a draft on the captain's attention, distracting him from careful study of the enemy





It would be interesting to see experiments with some method of day fireworks. The Japanese are clever in showing floating shapes of horses, boats, etc., in the air, and we might make use of paper shapes which would float in the air to indicate numbers or even well-known manoeuvres.

The smoke may interfere at times, but these would be more likely to be visible than any system of flags or shapes which we could hoist on board ship, and in closer quarters the whistle would be used.

There is no question in my mind that an admiral or captain would be unable to remain cooped up in the present conning-tower during an action. He would require a position from which he could see more, and if we cannot improve the present tower, might we not materially increase his power of observation by having a second tower aft? There a subordinate would be stationed who should be in direct communication with the other tower. Both towers should be fitted with the same instruments, and perhaps it might be well to have the captain of the ship and the navigator in the after tower and the admiral and his chief-of-staff in the forward one. It is surely better to separate those who will succeed to the command in case of accident to the commanding officer.

Another point which the essayist has touched on lightly, but which would seem to merit a little more attention, is the following: "We do not know the tactical qualities of many of the newer ships, and it is not good policy to publish the tactical data of those now in commission." Knowledge of the tactical data of an enemy's ships would be of great advantage in or before an action. Let us then cherish the little we have found out about our ships and throw at least this obstacle in the way of an enemy knowing as much as we do. We invite foreign officers, naval and military attachés, to our gun tests; armor and steel contractors are so anxious to advertise their products that they give all possible information in regard to them, and the contractors for our ships are equally ready to furnish foreigners with information to show the handiness of the vessels they have built. Are we not a little too willing to give foreigners all the data they request?

The essayist's diagrams of gun-fire and effectiveness of ships give an excellent idea of the powers of the various types of ships.

As regards the manoeuvre of "charging through" an enemy's line, which is claimed to be the great desideratum to be striven for, I do not entirely agree. That such a movement may be advantageous at times is evident, but it would seem that the second or third line of weaker ships would be in a most embarrassing position should the enemy turn short under their sterns and form column, provided, of course, that the lighter vessels could survive an action at such close quarters as they would be exposed to in passing between two of an enemy's ships. Another point which seems worthy of consideration: would not the fire of our own adjacent ships be likely to prove decidedly uncomfortable, if not actually dangerous, to our friends? We aim to hit our enemy, of course, but even at such close quarters an error of a few degrees would carry a projectile clear of an enemy's top works and land it in a friend's side. If, however, this method is employed and we decide to carry torpedoes on



in the brief time available after sighting him. We are too apt to become doctrinaire in these long intervals of peace and to welcome the introduction of a number of refinements both in material and tactics that will disappear in the first breath of war. Simplicity should be our aim in all things. I am glad to see that the essayist stands so unreservedly for this cardinal principle.

I am not quite sure that I understand his views as to broadside versus end-on presentation. He is right as to turning your bow towards the enemy if you wish to approach him. That I regard rather as a necessity than as a thing to be sought after for itself. At close range, again, he seems to prefer engaging bows on, from defensive considerations. This conception of his views is further strengthened by his advocacy of the dash through in line. If such be his judgment, I regret that he did not give more space and time to the proof of his contention, for it is the crux of the whole matter. Grant that and the rest follows. Personally, I am not ready to concede the premiss until it has been established. I lean strongly the other way, believing in the superiority of broadside fighting. I may be in error, but I am open to conviction. A formation for opening battle that employs *less* than half one's guns must, in order to be adopted, hold out great and tangible advantages over a formation that brings in *more* than half.

There is nothing new under the sun. I shall be greatly surprised if, in the next war, the old-fashioned dodge of raking does not reassert its value. This will undoubtedly be true of unarmored craft, although it may be less true of those armored.

The essayist has, in my opinion, demonstrated, if demonstration were needed, the preferability of rectangular over direct movements. I could wish for more descriptive definitions even at the risk of coining new terms.

Incidental to his just remark that "as many methods of interior communication should be available in each ship as will enable her commanding officer to handle her effectively" comes the reflexion that the elaborate apparatus now in use is liable to derangement or wreck in battle, and that other means are not only required, but that they should be frequently employed in practice to secure satisfactory working.

The tactical propositions are worthy of acceptance in the main. I am disposed to challenge the 23d, and ask sufficient reasons for taking the admiral out of the line of battle. This is a moot question. It has been solved practically both *pro* and *con*, yet the balance of historical precedent is against it. I can recall no great sea fight where the admiral was not in the line.

It is worthy of note that the essayist's expressions are not lacking in strength when he speaks of the imperative need of homogeneity in our fleet. They illustrate and enforce his view that the types of vessels are a military concern, yet we all know that technical interests have largely determined the features of our building programme. In the value of any fleet, uniformity of type is among the chief factors, yet we go on multiplying types until our new navy presents the aspect of a job-lot of

samples. Individually, our ships are admirable. When we group them together their incongruities become manifest. Why not adopt a standard pattern for each class, reproducing the vessels until the logic of progress forces us to recast our scheme in its entirety? There will still remain ample scope for improvement in details without altering principal dimensions, tactical qualities and battery distribution. The essayist is but one among the many who recognize, in the continuance of a mistaken policy, a distinct menace to our fighting power afloat. What we want is a few ships of one kind, not many ships of many kinds. The Institute should speak in no uncertain terms upon this all-important point.

The essayist's mode of attack—line to line—is a surprise to me. It appears to follow as a sequence from an original formation that rules out a notable fraction of one's guns. An admiral so circumstanced must seek to bring his battery into fuller play. The obvious way is to change from line into column. It is conceivable that considerations of the moment may prohibit this manœuvre and impel the dash through with its free use of gun-fire at close range except when exactly abreast of the enemy. A general breaking up into a number of duels between ships seems then unavoidable; still the two lines may pass clean and clear through, barring accidents. This movement appears to involve a surrender of any advantage to be derived from skillful tactical handling, and to trust to luck or superior shooting to get out of the scrimmage with less damage than the adversary. The fleet would, in fact, be used, not as an integer, but as a collection of ships, each having its own separate task. I think that, in practice, neither admiral will venture to hold to the line to the last, so that this particular phase is hardly likely to be assumed by a naval action. If either should keep his fleet so formed he would, I take it, afford the other a delightful opportunity of distinction. In making these observations on the one instance in the essay which, in my opinion, requires further elucidation, I only mean to imply a Scotch verdict and to indicate some of the objections that might be urged against the essayist's position.

In his tactical rules I find nothing to question. The paper is an excellent one. It lays down principles that should govern the handling of ships in the line of battle, and spares the reader a multitude of illustrations which would only confuse and distract. As in our study of trigonometry at the Academy, if we only carry away with us the fundamental equations, their application to any especial problem is never very difficult; so, if our prize essayists give us the broad outlines of any subject as well as Mr. Niblack has done, it will be our own fault if we fail to fill in the necessary details.

Lieutenant JOHN M. ELLICOTT. U. S. N.—I am glad of the opportunity to discuss this essay, having given a good deal of thought to its vitally important yet practically neglected subject.

I think the author attaches undue importance to plunging fire as a tactical consideration at long range. The angle of fall of projectiles at extreme ranges does not exceed  $30^{\circ}$ , which is much less than their biting



angle, whereas their remaining velocity, already small, will be reduced by obstructed progress to the protective deck. Moreover, the range will change more rapidly with bow presentation than with broadside. In the latter it may be assumed that (if the enemy is allowing for his own speed while sighting) the danger zone is the breadth of your ship, but in the former, with the enemy merely guessing at your speed and attempting to allow for it, the danger zone may be only a fraction of your length, or even *nil*. If you were steaming toward the enemy at ten knots and he had your range at the moment of firing but failed to make allowance for your speed, you would in twenty seconds (a reasonable time of flight for long range) advance 340 feet, or about a battleship's length, and the danger zone would be zero.

The deflection of the protective deck in broadside presentation can scarcely enter in as a measurable factor because of the rolling of the ship; yet if she is rolling much she will, during half the time, present her protective deck to plunging fire at a good angle of impact, whereas she cannot pitch to the same degree and her bow presentation would be safer.

I heartily agree with the author in his remarks about scout vessels, although I think that the scout vessel should be of smaller displacement and greater speed than the *St. Louis*, and should be a carefully planned and developed type built by the Government, and that there should be plenty of these vessels built.

Tactical rules 1, 4, 5, 7, 9 and 10 proposed by the author seem to me to be sound and excellent ones. Rule 6 should be more a matter of discretion than a rule.

The first part of rule 8 would cause, I believe, a wretched blunder. The head of the column would be for a time out of action, while the rear would probably be cut off and enveloped by the enemy. Alternative (A) in this rule should be the rule, with (B) as a good alternative.

I should not follow rule 2 until I had first tried, by a simultaneous change of course of four points, to reach the enemy's flank. If he were alert he would no doubt make a corresponding change to prevent this, and the "charge through" would become inevitable, but if he held his course even for a very short time I should gain some of the advantage sought. The "charge through" must, however, be promptly accepted against the alternatives of showing a stern presentation or a broadside to a bow, except in a case which I will mention later.

The first method suggested in rule 3 for returning to the attack after charging through strikes me as a bad one. If the enemy adopts similar tactics the two wings of the supports will become for a time engaged in a running broadside fight on opposite courses leading them away from the fighting line, resulting in three separate encounters and ending possibly in a *mêlée*. Granting that the supports will promptly recharge through each other to regain their positions in rear, they will reach them in an unnecessarily crippled condition, and too late to reinforce the fighting lines during the second charge or the next manœuvre. The suggested alternative method is decidedly better, for the supports would then be kept well in hand and could promptly fill gaps in the fighting line made during the first charge.



dependent not only on the speed, but on the angle of entry, which varies with the roll of the ship, the roughness of the water, and accidental variations of the impulse. The development of a strong and reliable apparatus has been extremely slow. The English so far are apparently the only nation who have made a satisfactory solution; and that their solution is satisfactory the following random quotations will indicate:

1892. An English officer, an acknowledged torpedo expert, whose name I am not at liberty to mention, considered that practice from broadside submerged tubes up to a speed of 14 knots was as accurate as was possible with the Whitehead torpedo under any circumstances.

1892. The Royal Sovereign at torpedo practice at 600 yards at 11 to 12 knots: "The practice was not very good from the over-water tubes, but fairly good from the submerged tubes."—*Annual of Office of Naval Intelligence*, 1894, page 126.

1893. The Sanspareil at a speed of 12 knots was reported to have launched 14 torpedoes at a moving target (speed not given) 40 yards long and 700 yards distant. 5 of the 14 struck the target.

1893. The Vulcan at a speed of 18 knots made 11 hits out of 16 against a fixed target 100 yards long and 600 yards distant.

1894. Commander Sturdee, R. N., in the Prize Essay of the R. U. S. Institution, page 375: "From above-water tubes 450 yards may be considered as the effective torpedo range between ships under way, while an extra hundred yards may be allowed from submerged fire. Within that range about 50 per cent of hits ought to be scored, a larger percentage having been actually made in the different annual manoeuvres."

It may be added that if the English have succeeded, other nations will do so in time. Broadside tubes only have been considered, as bow and stern tubes, over and under water, are everywhere disappearing. The forward pairs of broadside tubes are usually fixed abeam, and the after pairs at an angle of 20 to 30 degrees abaft the beam. They do not admit of train.

3. This danger may be absolutely obviated by removing the drain plugs from the buoyancy chamber when the war-head is attached. This is the rule in our service. The accuracy of the run is in no way affected, as has been abundantly proved by experiment, and the torpedo must necessarily sink shortly after it ceases to run. A sinking lever, which automatically opened a valve, was formerly used for this purpose; but as it sometimes did not act, its effectiveness was discredited.

A word as to the control of torpedo fire aboard ship: I believe I am right in saying that the policy recommended in our service, and the theory on which our sighting arrangements are installed, is that the captain controls the bow torpedo exclusively, when there is one (the desirability of its presence is questioned), and gives general directions to the officers at the remaining sighting stations, "enemy on such a bearing," it being understood that the officer fires if he gets a chance. This is also the practice in foreign services. The captain cannot give his attention more in detail than this. But with this arrangement, and a "stand-by" from the captain, if the officer at the sighting station sees

a good chance to torpedo a passing enemy without danger to friends, as I believe he will in any form of "charge through," the torpedo is launched at once without further reference to the captain, except to notify him that the torpedo has been fired and to inform him when another is ready.

There is one consideration that somewhat impairs the above line of argument, and that is the effect of smoke in shutting out all except near neighbors. But this militates no more against the torpedo than the gun; and with the adoption of smokeless powder the inconvenience will be reduced to a minimum.

The essayist makes no mention of large torpedo-boats, or torpedo-boat destroyers, in the enemy's line. His own boats he places with the reserve. But it is quite commonly held abroad that these craft should accompany the battle-ships in the line, keeping under their lee in action. They would want no better chance than to have us charge through their line. But I doubt if Lieutenant Niblack would advocate the "charge through" in this case, even if we had an equal number of destroyers.

At least one other writer recently has held opinions somewhat similar to those advanced in the essay, in that he regards the "charge through" as desirable under certain circumstances; but he does not urge it as the "great desideratum." Lieutenant Calthorpe, R. N., in the R. U. S. Institution in May, 1894, in an essay that received special mention, writes as follows, page 488: "It is conceivable that it would be good tactics to endeavor to pass through the enemy's fleet 'en masse,' that is, in concentrated formation, invariably manœuvring to meet them 'end on'; and then to turn, reforming on guides immediately, with the object of falling upon them, if possible, in a weak spot, according to circumstances, before they have themselves had time to turn . . . and the side which succeeds in concentrating a majority upon some defective spot in the opponent's fleet will have gained a great advantage."

Generally speaking, he advocates other tactics, and quotes Captain Mahan as follows, page 496 of the Proceedings: "He believes that a fleet seeking a decisive result must close with its enemy, but not until some advantage has been obtained for the collision, which will usually be gained by manœuvring, and will fall to the best drilled and managed fleet."

His own conclusion follows on the same page: "This, then, would appear to be a very sound tactical principle. Try to out-manœuvre the enemy and fight him with your guns, remaining outside the range of his rams and torpedoes until you have obtained an advantage, and then fall upon him, in his weakest spot if possible."

He also has this to say on the subject of torpedoes, page 489: "A few officers there may be who are still of opinion that torpedoes should not be 'let loose' in a fleet action at all, on the grounds that they will be as dangerous to friends as to foes. Doubtless they might be if discharged indiscriminately, but in many cases (on first going into action, for instance, in a formation of narrow front) each ship might get beam shots on passing the enemy with, practically speaking, absolute safety to her consorts." As has been shown, there might also be chances in a line formation. Con-



tinuing the quotation: "Here, then, is the opportunity for submerged tubes. The dangerous objections (referring to over-water fire) already discussed disappear altogether; and this weapon, the submerged tube, I hold to be one, if not *the* most important engine of destruction in a ship. A vessel may be crippled, her steering gear shot away, her machinery disabled, half her guns dismounted or out of action, and, in fact, be in a semi-sinking condition, and yet retain intact on each broadside a weapon representing the destructive force due to about 200 lbs. of gun-cotton. The torpedo practice in our navy from submerged tubes has, on the whole, been very good at everything but extreme speeds, and fairly straight shooting might be anticipated with confidence at speeds up to at least 15 knots, which speed will probably not be exceeded by large fleets manœuvring in close order." Also on page 509, one of ten conclusions as regards fleets: "8. That torpedoes should be freely made use of from the beams of ships, when passing the enemy at close quarters."

Commander Sturdee's opinion as to the method of going into action, in the essay previously quoted, page 396, is as follows: "I lean very strongly to the opinion that the gun is the most important one (weapon) at first, because, as in the case of a single-ship action, on account of its long range; but even more so of the danger of coming within torpedo and ramming distance without having first obtained an advantage over the enemy, and I would lay it down as an axiom that no fleet should risk a close encounter (at first) without having obtained a tactical advantage over the other one, as otherwise it becomes a matter of chance what will happen on a charge being made, supposing both fleets are equal and in similar formation." He also cites Captain Mahan in the quotation already given.

After a careful reading of the essay, the advantages claimed for the "charge through" seems to be that, if the enemy is in some form of simple or double line, and the attacking force is in two or three indented lines or lines of sections, then the attack will by its formation possess a better command of fire, some of the supporting ships of the second or third lines may find a chance to ram ships of the enemy disabled in passing through, and the squadron which reforms quickest after charging will possess an overwhelming advantage.

Now comparing the two formations as described above, and supposing the fleets of equal strength, it will be seen that one is essentially a broad front formation with slight depth, and in the other the front and depth approach equality.

Then suppose the enemy to be a believer in this principle, page 21 of the essay: "To remain in line, the enemy being in any other formation, is to invite a concentrated attack on either flank." The line would evidently soon be abandoned. It will not do to say that you are not in another formation, for if you have three lines your formation resembles column of divisions; and it is in any case a narrow front formation as compared with the enemy's.

If the enemy remains in line until a charge seems imminent, he still has

one or two counter-moves. His flanks overlap at both ends of the line if the demonstration is against the center. He may form indented columns on the center of wings and allow you to pass through, unless you still have time to countermarch. All his inner broadside guns and tubes will bear, and only those of your flank ships.

Or he may leave his center to receive the charge, countermarch with his flanks, form column or echelon in the rear, and envelop you on either hand, trusting to his center to reform and bring up the rear. You would hardly attempt to reform under these circumstances.

But it is not very satisfactory to follow through a series of counter-moves, except in the war games, for the simple reason that you cannot assume your adversary's answer.

Therefore suppose the charge to be made as intended. It has already been shown that the enemy having no rear lines to hamper him will be free to use his beam and quarter torpedo-tubes as soon as they bear, without in any way endangering his own line, and with every chance of successful runs on diagonal courses across your compact formation.

Then, too, the enemy with his simple line can reform in about a quarter of the time it will require for the deep formation by either method described in the essay, and will hence secure the "overwhelming advantage."

Finally, the question of the "charge through" reduces itself to the supposition that the attacking fleet is possessed of greater skill, first in the adoption of its tactical formation, and second in reforming after the charge. Now, as in "charging through" I believe it to be clear that the attacking fleet subjects itself to the possibility of both torpedoes and accidental ramming, it would be by all odds the part of policy to use its superior skill in selecting tactical formations that would permit of concentrated gun fire on portions of the enemy until he was whipped in detail, to avoid the enemy's rams and torpedoes if possible, and not to seek to use the ram or torpedo except when forced to do so in defense, or in the final onset after some considerable advantage had been already assured.

In conclusion, I will say that I agree with Lieutenant Niblack in the other features of his essay, and congratulate him on his success. I shall not venture to hope that my arguments as above cannot be controverted, but I offer them as giving another view of a very important matter.

Rear-Admiral S. B. LUCE, U. S. N.—I have read this essay with pleasure and profit. The writer approaches the main question in the true spirit, laying down general principles and reasoning from them in a logical manner. This is the only proper method of reaching just conclusions.

One of the causes, I may say the chief cause, of the variety of opinion as to the best battle formation for a fleet lies in the ship which is to take its place in the line of battle, commonly called the line-of-battle ship. The battle formation is determined by the tactics of its units, and the tactics of the units are determined by their chief characteristics. Variety of characteristics requires variety of treatment.



In the galley period, when the ram was the principal weapon of offense, the battle formation had to be in line, or modifications of the line, the prow pointing towards the enemy. It could not possibly be otherwise. The crescent formation of the Persian fleet at Artemisium, the formation at Arginusæ, the indented line of the Roman fleet commanded by Cæsar off Alexandria, the double echelon of the Romans in the battle of Ecnomus, are familiar examples of this. On the first introduction of guns on board ship, the galley, or, more correctly speaking, the *Galleas*, had end-on fire, as at Lepanto. The gun and the ram acting in unison necessitated a continuance of the line as the normal formation for battle—the line, that is to say, with its modifications of echelon, single and double, or with its flanks thrown forward, as in the crescent formation. During the sail period the tactics of the ship was equally imperative in requiring the principal battle formation to be in column, in order to present to the enemy the principal weapon of offense, the gun, which was placed in the broadside. The ships themselves were in column, while the guns were in line. No other battle formation was possible.

Some of the earlier writers on steam tactics, finding the gun still in broadside and the ram restored to its ancient functions, were compelled to give the battle formations of both the periods represented. Hence they laid down the rule: "The line (single or indented) for ironclads and rams; the column (single or indented) for ships whose offensive powers lie in their broadside batteries." The effort to adopt one standard battle formation for both classes of vessels, without due regard to the principal weapons of offense, naturally led to some confusion. It was an attempt to formulate a system of fleet tactics without considering the tactics of the units. The resultant confusion was somewhat intensified by practice when fleets composed of various classes, or rather of various types of ships, have undertaken to perform military movements. In the battle of Lissa, both the Austrian and the Italian fleet were composed of the latest type of ironclad of that day, and wooden sailing-ships having auxiliary steam power. With the heterogeneous assemblage of ships, Tegetthoff bore down on the Italian fleet (the latter in column of ships) in column of squadrons, each squadron formed in double echelon. The Kaiser, an old 90-gun ship, with head booms and the old style of cut-water, undertook to ram the Italian ironclad *Rè di Portogallo* and was fortunate in being able to reach an anchorage in San Giorgio. I have referred to this incident in the January number of the *North American Review*. At the battle of the Yalu the Chinese fleet came out to give battle in an irregular line, while the Japanese moved up to the attack in column. Referring to this battle, Admiral Colomb, of the English Navy, says it was a trial of strength between two tactical formations—the line and the column. "I ventured to declare in former tactical studies," he says, "that the line-abreast was an exceedingly weak formation which ought to succumb to the line-ahead in all cases where things are otherwise equal." (Essay on Naval Defense, 2d Edition, by Vice-Admiral P. H. Colomb, R. N.)

In his very clever and entertaining skit describing, in the "Battle of

Dorking" style, a battle between an English and a French fleet, Captain Eardley-Wilmot of the English Navy forms the English fleet in double echelon, "the flagship leading, the other vessels ranged on her quarters, making an isosceles triangle. Thus the squadron had the shape of a wedge, in which each ship's ram and bow fire were clear of the next ahead." This was the formation of the Roman fleet under Marcus Atilius Regulus, minus the *triaris*. [An account of the principal battle formations of the galley period will be found in Proceedings of the U. S. Naval Institute, Vol. III., No. 1, April 20th, 1876.] The French fleet were "in two divisions, line ahead,\* a formation that meets with the unqualified approval of the metaphorical Paul Brachet," and, by implication, that of the ingenious author.

I have traced these successive steps in the history of naval tactics with a view to calling attention to, and emphasizing the fact that the essayist has touched the root of the matter when, to the question, page 20, "In what formation should we approach to the attack?" he answers: "that in which the maximum number of heavy guns can be brought to bear at long range." This sound principle had already been enunciated on page 17, where it is stated, as the summing up of the 31 tactical propositions, that "the most practical method of arriving at sound conclusions is to analyze the gun fire and the tactical qualities of the ships we have, and deduce tactics to fit them."

As the line of battle, which forms the basis of every system of tactics, must be made up of ships of sufficiently high military value, I cannot help wishing the author had been a little more explicit in the statement first quoted, and had recommended, as no doubt he intended to do, the deducing of a system of tactics best adapted to the gun fire and tactical qualities of *our line-of-battle ships*. A system of tactics based on the offensive and manœuvring powers of a ship of the line of the Massachusetts type might not be suitable for a light cruiser of the Montgomery class. The rôle of each class is essentially different. It will be the duty of the tactician to classify our ships and indicate those that are to be admitted to the line of battle and those that are to perform functions in connection with the line of battle, and from those elements to deduce his system.

In the passages first quoted lies the gist of the whole question. It was that very principle, as laid down by the author, that determined, as we have seen, the battle formation in the oar and in the sail period. Reasoning from that fundamental principle, the true solution of the problem cannot be very far off. The English Naval Prize Essayist of 1879 said of naval tactics, "We are groping in the dark," a fact we may reaffirm with the qualification, thanks to the author and those working on the same lines, that dawn is breaking.

I find myself compelled to dissent somewhat from the author on one point. He recommends, on page 27, that a complete scheme of tactics "should be worked out by one or more drill squadrons, or a *fleet of steam launches*. . . ." If we can keep up one squadron of evolutions we

\* *New York Herald*, Sunday, Jan'y 26th, 1896. Fifth Section.



will do well, but the flotilla of launches is a poor substitute for it. The views on this subject of the distinguished French Admiral Jurien de la Gravière may well be quoted on this point. It was proposed some years ago in France to reduce naval expenditure to such an extent that the Minister of Marine would be no longer able to keep up the Mediterranean squadron of evolutions. "That squadron," the admiral observes, in opposing its abolition, "is the school where the young officers apply the knowledge acquired in all others." "It is the source," he continues, "whence our officers and crews derive their true naval spirit. For this reason alone the squadron of evolutions should be maintained at any cost. But a more important consideration yet urges its continuance. *It is our only school of tactics.* The fleet most thoroughly drilled in naval tactics will have the greatest advantage in war."

"When opposing fleets join battle the lines will be broken through, and immediately every ship will have to reverse her course to resume the fight. This manœuvre must almost inevitably result in collisions among ships of the same fleet. If these ships are all homogeneous, and describe equal arcs of evolution, the risks of collisions will be small; and if to this there be added a constant habit of manœuvring together, those risks will disappear altogether. It is not simply in practising regular evolutions and following geometrical lines that gives the self-possession so essential in battle. Neither single cruisers nor the semblance of a squadron composed of steam launches or gunboats constitute an adequate school for this difficult art."

"It is absolutely necessary to accustom oneself to handling, within contracted spaces, masses of from eight to ten thousand tons, which cannot collide without mutual destruction. One must become accustomed to the imminence of such dangers; to become habituated to the close order of steaming by night as well as by day, in fair weather and in foul; to know how to form groups; to extend the lines, to mass the ships or to throw them out in echelon. Above all, one must be possessed of the faculty of placing himself in full sympathy with the commander-in-chief, to have an intuitive perception of his designs, and to anticipate his movements without the use of signals. Herein lies the whole secret of naval tactics. There is but one definition for this species of tactics: it is the art of manœuvring in battle, and while rendering support to your consorts, to avoid fouling them. The most skillful are those who can execute fleet evolutions when the transmission of orders has become impossible. The very last measure of economy France should resort to, then, is, in my judgment, the dispensing with the squadron of evolutions."

Did these views need confirmation it would be found in the work accomplished by the French squadron of evolutions. It has produced two of the best works on naval tactics. The *Tactique Navale* and *Tactique Supplémentaire à l'usage d'une Flotte Cuirassée*, par Vice-Amiral Cte. Bouët-Willaumez, was the direct result of that officer's term of service as its commander-in-chief; and this was followed by *Escadre d'Evolutions, 1868-1870, Considérations Générales sur la Tactique Navale*, par Vice-Amiral Jurien de la Gravière.

In the course of a few introductory remarks in the later work occurs the following: "Chargés par le Ministre d'entreprendre la révision du livre des signaux et de la tactique officielle, nous n'avons pas perdu de vue les conditions dans lesquelles cette révision allait s'accomplir," etc.

It will be seen from this passage that the French Government took sufficient interest in such matters to direct the commander-in-chief to utilize his squadron as a School of Application and to do exactly the work proposed by the essayist. That is one picture, and here is another. It is within the memory of men still living that attempts to utilize an American squadron for similar purposes were repeatedly and determinedly frustrated by the American Government; and when, with the remains of a depleted squadron, a final effort was made in that direction it was seriously proposed to make the officers concerned pay for the coal expended! Is it to be wondered at, then, that the author should tell us "our books on tactics are primers, our signal books a monument to those who do not go to sea"?

The essayist has very properly devoted one chapter to definitions. Naval tactics is entitled to a terminology of its own. But I think the author is slightly in error when he says, page 9, §6, that our books on tactics are based on foreign works. He then tells us that *column* is here taken to mean "line ahead," etc., etc.

Commodore Foxhall A. Parker, U. S. N., prepared his *Fleet Tactics under Steam* in 1869. It was published by authority of the Navy Department. Six years previously he had been drilling seamen with a field battery of naval howitzers, and conceived the idea of adapting the movements of an assemblage of fieldpieces to the flotilla he subsequently commanded. In the preparation of his work he was no doubt indebted to the treatise of Vice-Admiral Bouët-Willaumez. However that may be, Commodore Parker discarded the terms that had been used in the old naval tactics under sail and stated that there "are but three formations for a fleet . . . any one of which may constitute an order of battle, viz., line, column, echelon."

Captain Hoff, in his last work on tactics, adopted the same terms. It seems hardly necessary, therefore, to use "foreign terms to express formations," or even "to state their equivalents." Captain Hoff also uses the term *line-of-battle ship*, a name by which our first-rates should be designated. Under the head of Tactical Propositions, page 10, the expression "steam fleet battle tactics" is unnecessarily cumulative. The word "blank," in "to blank some of the enemy's gun fire," sounds (or reads) like the euphemistic form of the not wholly unfamiliar damn. Thus in one account of the battle of Mobile we read that Farragut cried out: "*Blank the torpedoes! Go ahead!*" The verb "to blank" is used here, presumably, in the sense of *to mask*. The latter word has the sanction of good military usage. But these are very small matters. The essay is an able one, and a welcome indication of the progressive spirit of the Navy.



Lieutenant A. A. ACKERMAN, U. S. N.—Lieutenant Niblack is to be congratulated upon having so clearly and briefly brought the fundamental principles of a modern naval tactics into one's mental grasp. The essay is all the more admirable that in spite of its brevity it is so full of suggestion. No one can read it without beholding in every direction vistas of possibilities and being impelled to investigate for himself this old subject revived through changed conditions to a new and fascinating youth.

While thus recognizing the great value of the essay, there are certain considerations to which I ascribe a different weight than the author, and accordingly carry my conclusions not so far or farther than he does. Possibly my lack of experience in fleet manœuvres, or their systematic study as pursued at the Naval War College, has permitted me to err, in which case a speedy correction is most desirable.

Modern naval tactics seems to be a tactics of gun fire alone. When it is considered what great sacrifices are made in order to clothe battle-ships in armor, or to give them a knot more speed, it is natural to desire to get some return; yet battle-ships, when in fleet formation, are to be handled almost as gingerly as cruisers, and their extra speed, if they have any, is thrown away.

Now it would seem that that admiral whose tactics required the armor to do its share in the fight as well as the guns, and which made the knot more speed compensate in some way for the consequent lighter battery, would be more worthy of success than the one who treated his ships like so many units.

The fact is, the effect of gun fire under battle conditions is as much overrated as the defensive power of armor is underrated. The battle-ships are built to stand punishment, and if any of them are disabled by gun fire alone, it will be because of a lack of armor rather than in spite of it.

Thus far the characteristics of individual ships seem to have been assigned neither credit nor debit values in naval tactics. In fact, two of the most important of all, namely, ammunition supply and marksmanship, have not been mentioned at all; yet both of these are deeply involved, and merit early consideration in the design of the ship.

One agrees with Lieutenant Niblack that we must deduce tactics to fit the ships we have. But then our ships should be designed to fit the grand tactics best adapted to the exigencies of the national defense; so that actually the best minor tactics are derived ultimately from the best grand tactics. Thus grand tactics will fix the size of the fleet, its disposition, and the duties and responsibilities of its various subdivisions. And the duties of the individuals should determine their draught, coal supply, speed, offensive and defensive powers, and finally, the minor tactics.

For example, it is possible for a nimble opponent with numerous ships to establish a flexible blockade, which would recede without breaking before a sortie of coast-defense vessels, only to flow back when the pressure was relieved. And this might continue indefinitely before one or more ports, until there was concentrated an overwhelming fleet

capable of crushing the defenders of each port in succession. This seems to indicate the advisability of adding to our purely defensive fleet of battle-ships a number of powerful armored cruisers carrying 10 or 12-inch guns. In these vessels the offensive should predominate. It is asked, however, that the supply of ammunition to their guns should at least be no more precarious than the service of the guns themselves. They should have speed and a great radius of action; in fact, they should be the stormy petrels of the Navy; and living and fighting at sea, the question of draught should not be permitted to impair their efficiency.

With regard, however, to the defending fleet. Our coast and harbor-defense vessels cannot choose their opponents. They must take issue with any and all who come. Reliability and endurance are, therefore, qualities which in these vessels should overshadow all others. At the same time their offensive powers must be great, or they will fail in their purpose of intimidating or destroying the enemy, while perhaps not suffering destruction themselves. It must be admitted that when the individual organizations lack the quality of endurance, to say nothing of *permanence*, the most brilliantly conceived evolution may result in confusion, if not demoralization. Failure to consider this fact must condemn any tactics. Yet theorists regard a ship as more or less formidable, if we take the diagrams, according to the energies of its gun fires and the arcs over which these energies may be delivered. Nothing is said of the vulnerability of the ship, and yet upon that more than the dependent gun fire, speed, or any other quality, rests its ability to carry out its part of the evolution and maintain the fight. It seems no more than common-sense and good military practice to take full account of the effect of more than probable disasters. It is the weak points in a ship's design, and its interior organization as affected and dependent upon that design, which will determine its value and reliability in war, quite as much, if not more than, the arcs and energies of its gun fire.

The less vulnerable the battle-ships are, the more independent they will be; the greater the power to extend a line of battle without rendering it fatally weak, or to undertake isolated movements without fear of being destroyed in detail. With an extended formation every gun may be brought to bear, while concentration is certain to mask some of them.

The time interval mentioned by Lieut. Niblack is most important as affecting concentration of fire when the fleets are moving past each other. If, for example, it is intended to concentrate the fire upon a certain squadron or division of the enemy, and the opportunity or necessity for a "charge through" presents itself, the formation of columns of sections in three lines as proposed by Lieut. Niblack is undoubtedly most powerful. I prefer, however, on account of the time interval, to go farther and close up the lines for the charge, forming from each column of sections an indented column. For the enemy has a time interval as well as ourselves, so that if we can place a new Hartford at the head of the column to take the first shock without faltering, the advantage of the continuous concentrated fire delivered by each suc-



This makes all the more clear the importance of the *previous knowledge of plans* upon which Lieutenant Niblack has insisted. The *ability to execute them* may vary momentarily; it is dependent upon the rigor of the training and the effective organization of the *fleet*, however, rather than upon that of the individual ships. In fact, a thorough fleet training is absolutely necessary if it is hoped to profit by the advantages claimed for the defense of our coast by vessels especially designed for that purpose.

With regard to reserve speed. If all movements are to be successive, then it will be practically impossible to obtain the greatest efficiency under favorable conditions from all of our ships. In other words, various important battle characteristics in certain of our ships have been sacrificed to an extent in order to obtain a higher speed. If, then, we fail to make use of this greater speed, we are not fighting these ships to the best advantage; they have in fact lost not only prestige, but actual power on joining the fleet. The loss of what otherwise might have been increased gun fire or armor protection, which would thus be experienced by a large number of our ships should they be formed into a fleet, would be enormous. I would suggest as a preliminary formation that would make both armor and speed do their part in the fight, columns of divisions in line abreast. Let the heads of the columns be the best protected, and hence, perhaps, the slowest ships, the rear to be the fleetest, and thus most able to quickly change the formation. It seems almost axiomatic that all movements, in the immediate presence of the enemy, should as far as possible be based upon the slowest ships. The admiral must favor them in every way possible. If the battle is not joined in their vicinity, they may never get in it at all, or get in it too late. However he may use his faster ships to cloak his actual intentions, the final manoeuvre should be such that the least loss results from the peculiar weaknesses of the different ships, and the maximum offensive power is brought to bear on the enemy.

It would seem that during the period of approach to the enemy more attention should be paid to tactics than to an effective delivery of gun fire from individual ships. The formation should be such as presents the greatest number of alternatives for engagement. The enemy is thereby rendered uncertain and puzzled; his movements can be most easily countered, and your own initiated. Of course get as much out of the guns as possible, but no really important advantage will be secured by long-range firing against an opponent who is at all formidable. The probability of hitting a ship bows on at 2000 yards range is of course great, the angle subtended by her beam being about 35°; but unless she is very weakly armored, the obliquity of the impact is so great that penetration will hardly be obtained except over unprotected surfaces. The angle of descent of the projectiles at that range is not sufficient to produce any material advantage from a "bows on" fire, and if the range is increased until any actual advantage is obtained from this angle of fall, the chances of hitting would become exceedingly small. On the other hand a very direct, and hence powerful, fire, with a plunging effect, may

be obtained when through unbalanced turrets the enemy's ships are heavily listed merely by training the guns abeam. There are a number of such ships in foreign navies; of course broadside engagements will be avoided by them and sought by their opponents. When listed, the belt on the near side is rolled under water, and that on the far side lifted out. In either case the machinery space is much exposed.

The unprotected portion of the target offered to the enemy when "bows on" is quite small; still if it is struck, it is possible that much more damage will be done than when the broadside is exposed.

As for the broadside position. The difficulty of seriously injuring a hostile ship which is on the alert and moving at a moderate speed, by ramming, is very great. It is not believed that special precautions as to formation need be taken to avoid this kind of attack by the enemy's line of battle. Any formation would, however, be thrown into confusion if it was necessary for the individuals to avoid rams; doubtless this will be the chief result accomplished by vessels of that description. While feeling the force of Lieutenant Niblack's objections to the échelon formation for slow ships, it seems evident that most of them can be overcome by the use of direct movements and reserve speed. Undoubtedly if an échelon be "attacked on its flank in the direction of its line of bearing, the fire of all the ships on that bearing is blanked." The same thing, however, can be said of a line. The échelon has the advantages of both line and column, with the disadvantage that a readjustment of distance is required if a change to either one or the other be made. Should the admiral with his fleet in échelon permit it to be attacked in flank, it would be little or no worse for him than if the mishap occurred when he was in line or column.

At the risk of taking up too much space in a digression, I must protest against the employment of the diagrams showing the arcs of train and energies of the guns of different ships as representing the efficiencies of their gun fire. It is granted that custom has sanctioned it, but it is nevertheless far from being correct. The fact is these diagrams, viewed in this light, represent the summation of an indefinite number of constant values or possibilities of energy, delivered under ideal conditions which continue over an indefinite period of time. Such a comparison would be of little value even if the work of our battle-ships was limited to bombarding defenseless cities or sinking peaceful merchantmen. For if the diagrams are true for one broadside, then they are not true for the other at the same time; if they are correct on any line at one moment, they cannot be correct on any other for a period of from one to six minutes. The diagram in fact merely conveys a limited amount of information which is seriously qualified by conditions of which it says nothing. The object of the battle is to produce changes, disastrous changes, in our adversary; and we know that we too will suffer from them—that some of our ships are more vulnerable than others and will suffer earlier and more severely.

There is not a ship designed but has its special features, its advantages and its disadvantages; and both in some ships are so glaring and im-



sider battle tactics only with reference to the gun, since the use of the ram and torpedo in fleet actions will be only occasional and largely accidental.

The fact that the gun has increased in penetrative power I do not believe will invalidate the plain lessons to be drawn from the study of naval and military history and tactics of the past and the valuable object-lessons of battles of bygone times; for with the advancement of the gun has come protection to meet it (in the fighters), or speed for defense (in those that run away). The ratio of the elements of offense and defense continues to be about the same.

Taking up Lieut. Niblack's tactical propositions, it may be noted that he enunciates them "as the principles on which any scheme of fleet battle tactics must be developed."

Taking the first, it seems to me that the captain cannot possibly keep track of all the things counted necessary for him to know, or handle all the weapons which communication has placed at his hand. With the complexity of the present war ships the captain should occupy much the same position as the general of an army—his corps of subordinates, *within reach of his voice*, should control the ship and her weapons.

I would suggest that instead of boxing the captain, several officers and a helmsman in a conning tower with about fifteen things to handle, that an armored space similar to a turret be provided (of size suited to the ship), which would contain the means for controlling the ship and her weapons, and enough officers to carry out without confusion the captain's general directions.

The captain's mind should be freed from annoying details during the conduct of an action, and it would be better if he could not see the wheel or the other details usual in a conning tower. If he himself is stationed in a small conning tower communicating with, and directly over the armored space containing the means necessary to carry out his orders, he can more coolly direct his ship and give his orders. One officer might control the battery directly, another the torpedoes, another the position of the ship in squadron, etc.

We all know that the officer directing the movements of the ship should not be at the wheel himself, and on the same principle it seems to me that the captain's attention should not be distracted by any possibility of having to attend to any detail himself.

2nd proposition. I think all signaling in tactical evolutions should be by whistle or siren. Either can be heard to the limits of a good-sized squadron, as every officer knows who has heard the flagship at the head of a column in a fog.

The necessity for limiting the number of battle signals then largely disappears, as sound signals can be quickly made, and, if necessary, repeated from ship to ship. It is easy to have a number of whistles, in case one is shot away. I think we are all pretty well impressed in this squadron with the lack of success attained with flag signals, even without halliards being shot away.

6th proposition. I believe in direct movements, and only in rectangular

movements when you lack sea-room and time; but neither apply in the system of battle tactics to which I refer later on. When either a rectangular or a direct movement is necessary, I would prefer the direct, and believe (leaving aside the considerations of sea-room and time) that the objections to it are caused by lack of homogeneity of our war vessels, which should be remedied by gradually forming homogeneous squadrons of all classes as the Navy increases in size. No system of tactics can be evolved, nor one properly tested, in a squadron which contains the *Montgomery* and *Columbia*.

17th proposition. This seems the most valuable of all the tactical propositions. "Tactics should, by judicious formations, aim (b) offensively to reduce the tactical efficiency of the enemy by concentrating the attack on one or more of the units of his fleet, particularly on the flank, or on a manifestly weak part of his formation."

This is the backbone of all tactics, whether on land or sea, and should be a motto in preparing any system of tactics.

Captain Taylor, in a paper on Battle Tactics, in Whole Number 37 of the Naval Institute, points out the value of concentration, and suggests a solid square for the approach to the attack, in order that the principle of concentration may be carried out and the greater number of vessels thrown upon the less. This is the system of tactics which I think will prove the best, whether the solid square is the best form of massing or not; some massed formation will, I believe, be used for the advance to the attack, and deployment will be made for close action according to the formation of the enemy's fleet. I do not think that it will be possible, however, to deceive the enemy by feigning an attack on one point and then attacking another. That is a principle of military tactics made inadvisable by the fact that movements are too clearly seen and gun fire too unimpeded, and a feint simply means longer exposure to gun fire in a formation making a big target.

The 24th proposition, "that the best initial formation for the approach to the attack is *line in some form or other*," and the 3rd proposition, of the fleet in action on the open sea, "that a charge through, line to line, with the enemy, should be eagerly sought for, and tactically striven for," I believe is subordinating grand tactics to minor tactics, and that these are incorrect conclusions based on probably good premises.

The handling of a fleet worthy the name is grand tactics. The fact that steam fleets of to-day have the advantage in certainty of movement over sailing fleets but emphasizes the necessity of a system of grand tactics which does not include a charge through as a desideratum.

In this connection I cannot do better than refer to an article "On the Study of Naval History" by Admiral Luce, in Whole Number 41 of the Naval Institute, from which I will now quote:

"For it should be remembered that in Howe's great battle of the 1st of June (1794) he exhibited no such fighting tactics as was afterwards practised by Nelson. With his accustomed exactness he formed his line with great precision and stood down for the French fleet, each ship steering for her opposite, with the intention that all should pass through



and haul to the wind, to leeward of the French line. There is no hint of crushing any one part of the enemy's force by overwhelming numbers; no indication of an intention of doubling on the van or center, or of placing the enemy between two fires. It was simply the old custom of placing ship against ship, and allowing a great fleet fight to resolve itself into a series of single engagements. The result was the customary indecisive battle, and consequent popular dissatisfaction. Howe, then, was not a tactician in the sense that Nelson was. . . .

"Minor tactics change with the change of arms or improvements in naval architecture. Not so with grand tactics. But whether it was Phormio or Agrippa or Russell, a Nelson or a Perry, the victory has generally been with that leader who had the skill to throw two or more of his own ships on one of the enemy. That is one of the most valuable lessons of all naval history, and that, it may be stated here, is one of the fundamental principles of our science. It is the capacity to carry out that principle that gives evidence of the skillful tactician. It is the ignoring of that principle that serves as one of the most impressive warnings of naval history. . . ."

The excellent chart of diagrams of gun fire which Mr. Niblack has prepared, with the cost of the vessels represented on the same sheet, would be excellent material to use on Congress as an argument in favor of battle-ships, and we would have no more Columbias. Such commerce destroyers would be supplied by the merchant marine.

The use of language as an expression of ideas by one, and the understanding of it by another, being often different, I must confess that I am not entirely clear as to all of Mr. Niblack's propositions, and seem to find occasional contradictions in them. It is more than likely that my criticism—where criticism is found—is due to not entirely catching the meaning intended.

Captain H. C. TAYLOR, U. S. N.—An active mind working upon a professional topic of such importance as naval tactics must always produce results of interest, and the more so if the topic is one that has hitherto been neglected. It is not possible to touch upon all parts of the extensive field which our essayist covers, but a few remarks may not be out of place, coming from the Naval War College, whose interest in tactical questions increases as the subject is better understood. The diagrams by which Lieutenant Niblack illustrates the values of the different arcs of fire from typical ships in our Navy are destined to be of much service in working out questions of tactical formations, and it is found at the College that these diagrams repay long and attentive examination.

As to the indented line, there are some who believe that no object is gained in thus forming the line, and that the natural irregularity of the best formed line or column in the open sea is so great that the effort to indent it would produce greater confusion, and is, in fact, a striving after too fine a result in the case of great ships, rough seas, and the confusion of battle.

The essayist's plan of charging through in columns of sections has, I believe, much to recommend it, and the principle might perhaps be carried further. It has been suggested that a line of nine ships should charge in three columns of three each, sixteen ships in four columns of four each, or in such proportions as may be found desirable with varying speeds and different classes of ships.

I will not attempt to touch upon all parts of this excellent essay, and will only say that it shows throughout that a thorough examination of tactical questions has been made and that the conditions of naval warfare have been kept constantly in mind, resulting in the production of a most valuable professional work.

Lieutenant Niblack will, I am sure, permit me to suggest the advisability of extending and enlarging our idea of naval tactics and of including in it something more than questions of line, column, evolution, and the relative places of ships and their distances and lines of bearing. We recognize that there is something more in the tactics of armies than questions of depth of lines of battle, positions of artillery, and how cavalry shall be placed. These are not tactics themselves, they are only methods of carrying out a controlling tactical idea.

These ideas or governing principles of tactics, though few in number, are of various and diverse application as influenced by conditions of configuration of ground, hills and rivers, and by natural obstacles and strongholds.

It is very desirable that naval officers should give their minds to a full consideration of similar conditions in their effect upon the tactics of fleets. There will be little opportunity for this in open sea fighting, though even there the larger tactical principles must be first considered; but we may reasonably expect a great proportion of fleet battles under steam to be fought under such conditions of adjacent land and shoals, channels and islands, as to make their success largely dependent upon the advantage taken of these circumstances.

I would suggest to the essayist and all officers, therefore, to give much thought for the next few years to the broader field of tactics, in which must originate those primal laws which are to guide us in the choice of line, column or échelon, as well as in all the other numerous details of tactical drill.





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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

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SPEED CONTROL IN MODERN STEAMERS.

BY LIEUTENANT M. L. WOOD, U. S. Navy.

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When steam was applied to the propulsion of vessels, the control of the speed was effected by means of verbal orders passed along the deck to the engine-room. The boys employed on board the early passenger steamers in the Thames seem to be conspicuous in the accounts of travellers in those days.

In ocean steamers a system of communication was gradually developed which was in general use up to within a few years. This consisted of signals transmitted by ordinary bells, of which two were used, one a single stroke gong and the other a "jingle bell." The signals in common use were as follows with the single stroke bell: 1 bell (when stopped), "ahead slow." 1 bell (when going ahead full speed), "slow." 1 bell (when going ahead slow or backing), "stop." 2 bells, "back." The jingle bell indicated full speed on engine whether backing or going ahead. It was also used to indicate "stand by the engine" or "through with the engine." This system has stood the test of extensive practical use in all sorts of vessels, giving satisfaction until the introduction of more modern means. It will be noticed that the meaning of the signal depends upon preceding signals and the action of the engine at the time. A slight lapse of memory or of attention at critical moments might result in misunderstanding the signals for working the engine, with possible damage to the vessel itself or to others in close quarters.

The extent to which a system of sound bells can be developed is shown in some of the western river steamers of the United States. The old Mississippi River steamers, where the strong current, sharp bends, frequent eddies, with the necessity for stop-



ping, in case of a hail, at almost every plantation-landing with the bow up-stream, have a very efficient system which serves admirably for handling vessels under exceptionally difficult conditions, and, incidentally, as an example of extreme complexity. The larger river steamers were side-wheel, with each wheel actuated by a separate engine controlled by a complete set of signal bells. For each engine there were "go ahead," "stop," "back," and "slow" jingle bells; there was also a "shifting" (single stroke) bell to indicate reversing the "hooking-in" valve gear when the next signal would require a change in valve motion. This would seem complex enough, but, in addition, each bell had double pulls in the pilot-house, so all the bells could be worked from either side of the wheel. Besides these there were also bells to the firemen to "open doors" and to "fire up," and to the gang-plank engines, with voice-tubes to engines and other parts of the boat. The whistle was worked usually by a treadle or foot lever.

All this was manipulated by one man—the pilot—who, in addition, handled the steering-wheel alone, unless he had an apprentice—called a "steersman"—temporarily under his instruction.

To enable one man to steer the large steamers along their devious track, the steering-wheel was made large, ten to thirteen feet in diameter, with the axle below the floor of the pilot-house.

This was the system in use on the Mississippi river in the palmy days of the trade, and is still in use, with few changes, at the present day.

One peculiarity of this system is that every signal to the engine signified "full speed" unless accompanied by a "slow" bell. The signals are nearly all "positive" in their meaning, as they do not depend upon preceding signals.

In spite of its apparent complexity, this system of engine control certainly served its purpose, as the engines were worked with a promptness and certainty that resulted in the delicate and efficient handling of the vessels necessitated by the conditions of the trade.

In the older steam vessels of the U. S. Navy, including those yet in use at the present day, a system is in use differing from both those described, as it makes use of but one single stroke gong. With this system, 1 bell, "ahead slow"; 2 bells, "stop"; 3 bells, "back"; 4 bells, "ahead full speed." The advantages of this system are: that it requires but one bell, saving the cost of

the second bell and the wiring, and also that the signals are positive, having but one meaning, irrespective of preceding signals.

The principal disadvantages are: that it is noisy, hard upon the bell connections, that it is liable to fail at critical moments if signals are given under excitement or by an unpractised hand; that it is slow, as time must be lost waiting to see if there be a following stroke, which may change the signal completely; if obeyed too quickly and therefore improperly, hesitation or doubt is produced by the attempt to go ahead and back at the same time; that the first two strokes of "4 bells" is often mistaken for 2 bells, with the result that the engine is partially slowed, or even stopped, when "ahead full speed" is required to avoid accident; last but not least, there is no provision for backing full speed, which may be the only means of averting danger.

In fact, the "4-bell" system is about the worst in use anywhere. Its disadvantages come out strongly in the case of smaller vessels making frequent landings, and in these it is usually avoided by the adoption of the merchant code whenever practicable without attracting official attention.

There is a system of signals to the engine-room suitable for use on board vessels where it has not been deemed expedient to fit modern engine-room telegraphs, which has been developed probably by accident, but which has stood the test of practical working wherever tried. In this, two bells are used, a single-stroke bell and a jingle bell. The signals are as follows: 1 bell, "ahead slow"; 2 bells, "stop"; 3 bells, "back"; jingle bell, "open throttle," *i. e.* "full speed" on the engine whether going ahead or backing.

The advantages of this are numerous enough to warrant its adoption on board all vessels of the Navy not fitted with engine telegraphs. The signals are all "positive," since they do not depend upon preceding signals. The reliability of the bell is improved, as it does away with "4 bells," with its chance of breaking down or of confusing signals. It also furnishes the important signal "astern, full speed," which is an important one. The only change required to introduce this system would be the placing of a second bell on board vessels. This expense will be very slight compared with the lessened risk of damage due to more efficient handling.



In all these systems using sound codes the only information given to the pilot-house as an indication of the proper transmission of the signal is the sound, assisted by tubes, of the bell itself, which for this purpose is much louder than would otherwise be necessary.

In modern steamers the necessity for quicker and more reliable signals to the engine-room has developed the use of engine telegraphs, using visual signals in place of sound signals. As at present in use on board all, or nearly all, modern steam vessels, the engine-room telegraph, whatever may be the special design, consists essentially of a small lever moving over a dial on the bridge connected by various mechanical means with a pointer in the engine-room, whose motions are made to correspond exactly over a similar dial. Each position of the lever with the corresponding motion of the pointer indicates a signal and rings a bell to call attention. The signals transmitted are as follows: "Ahead, full speed," "three-quarters speed," "half speed," "slow," "stop," "back slow," "half speed," "three-quarters speed," "full speed astern." Sometimes other intermediate signals are used. The indication that the signal has been received is a return signal made by a lever in the engine-room which moves a pointer over the telegraph dial on the bridge repeating the signal and acknowledging the receipt of the signal to be carried into effect. The motions of the propeller shafts are shown by indicators in the pilot-house which indicate the motion and the direction of motion of the engines.

There are several designs which work efficiently upon the principles stated generally above. Their working is shown by thorough tests in service which demonstrate their utility. It will be noticed that the signals are greater in number than with the bell codes using sound signals, thus giving greater delicacy in handling vessels than was before thought possible or deemed essential.

The management of the helm has also been developed. Vessels were steered by a tiller on the rudder-head by hand-power directly applied, until the increase in size of ships led to the adoption of a steering-wheel to give increased mechanical power over the movements of the rudder. The shifting of the steering-wheel to the forward part of large steamers for convenience in

handling, necessitated longer wheel connections with increased friction, which in turn led to the use of engines for controlling the rudder. After many attempts, lasting through many years, the present systems of steam steering gear have been developed. The difficulties of the problem were great. A heavy rudder, in large vessels, weighing thousands of pounds, exposed to violent shocks from waves, was to be moved either by slight changes, starting from any position, or rapidly, from one side to the other. This motion had to be under perfect control, since the rudder was, by the conditions accompanying its use, required to follow exactly the motions of the steering-wheel on deck. Too much motion of the rudder was as bad as too little, since its duty is to steer a large, fast steamer to degrees of arc on her course, or, on the other hand, to change direction suddenly to avoid danger. These mechanical difficulties have been completely overcome, there being several designs of steam steering gear which can now be relied upon in every respect.

The general design of all the patterns is about the same, the principal differences being in the means used to attain the end. Steam steering gear in general is as follows: A small steering-wheel in the pilot-house, or on the bridge, in the forward part of the vessel, is connected by shafting and gearing, wire ropes, or combinations of both, to mechanism moving the valve of the steam steering engine in a compartment near the stern; this valve admits steam to the cylinders revolving the drum in the direction decided by the motion of the valve. A small motion of the valve produces a small motion of the drum connected with the tiller by chains or gearing.

This limitation of the effect is produced by a "stop motion," differing in different systems, in which a lug or projection attached to a cut-off valve follows the valve by the revolution of the drum until it catches up with the valve, when it stops the engine and, therefore, the tiller, by shutting off steam. It will be readily seen that the devices to produce this effect are necessarily too complicated for description here. They, however, have been found to do their work properly and are thoroughly reliable. When the small wheel in the pilot-house is moved slightly, the rudder makes a correspondingly slight movement, stopping in the new position, held firmly by the steering engine until the next movement of the steering-wheel. The serious



damage that would result to the pockets of the owners, and to the vessel itself, from erratic working of the steering engine in a crowded harbor can be easily imagined. This has resulted in the steam steering engine having been brought to such a stage of perfection in several patterns that it can be safely locked up in its compartment, after proper adjustment, with confidence that it can be relied upon to do its work for hours at a time. All steam steering gears are provided with arrangements for being thrown out of action in case of failure to act properly, but the cases of failure to work, when well installed and attended, are very few and far between.

As the movements of the rudder of a large vessel in a heavy sea are extremely violent, all parts of the steering engine are made with large factors of safety to withstand the sudden jerks.

From the above it would seem a settled fact that the commercial steam steering engine can be relied upon to move the tiller in any weather in exact accordance with the movements of the steering-wheel at the other end of the vessel.

To return to the discussion of control of speed. The question naturally comes up, Why is it not practicable to connect the engine telegraph, or a modified form of it, suitable to the new conditions, directly to the mechanism controlling the direction of motion with the speed of the engine, so as to work the engines directly from the pilot-house instead of from the engine-room platform?

It is the object of this paper to show that such a connection is practicable, that it can be made reliable, and that it is advisable, on the score of efficiency, by eliminating chances of error in transmitted signals, with increased rapidity in working engines, while preventing damage to engines and lessening the chance of accidents, by allowing constant general inspection while underway by those now stationed to work engines by hand in obedience to signals.

The following is the plan proposed for adoption without interfering with working the engines exactly as at present, when so desired. When the principle is once adopted, simplifications can be easily arranged, lessening the number of parts to suit the size of vessel and the different types of engines:

1st. Connect the engine-room telegraph, modified to suit the work, or a special connection designed for the purpose, to a small pinion or suitable gearing, which will move the valve of a small commercial steam steering engine the full extent of its throw, by the movement of the lever in the pilot-house, the motion being so adjusted that the "stop" position of the lever agrees with the position of the valve for "helm amidships." For convenience, call this small steam steering engine the "regulator engine." The pattern is immaterial, only the valve must be specially designed to move with as slight friction as possible, owing to the small travel of the lever.

2d. In place of the drum on the regular engine, fit a shaft, which, by worm and gear or rack and pinion movement, will move a frame sliding in horizontal guides, exactly as the tiller end is moved by a steam steering engine—the middle part of the travel of the frame corresponding with the "stop" position of the lever in the pilot-house and with the "amidships" position of the valve of the steam steering engine used for the regulator engine.

3d. To the frame, called for convenience the "regulator," attach two vertical stiff plates. One of these plates has guide pieces riveted on, or a slot cut, in which a cam, moving in vertical guides, slides. This cam is connected with the valve of the ordinary reversing engine governing its motion. The other plate is connected in precisely the same manner with the main throttle valve. The motion of both cams is controlled by the shape of the slots in which they work, thus regulating the position of the valve of the reversing engine and also the position of the throttle. For every position of the "regulator" there is but one position of the throttle valve and one position of the reversing engine; also these positions will be exactly those required for the most efficient working of the particular engine.

During the middle third of the travel of the "regulator," the direction of motion of the engine is controlled; the outer parts of the travel regulate the speed from "slow" to "full speed" with any degree of nicety required.

In this connection it will be noticed that the motion given to the sliding frame, or "regulator," and the power available for moving the main throttle valve with the reversing engine are both practically unlimited, as both depend only on the power of the



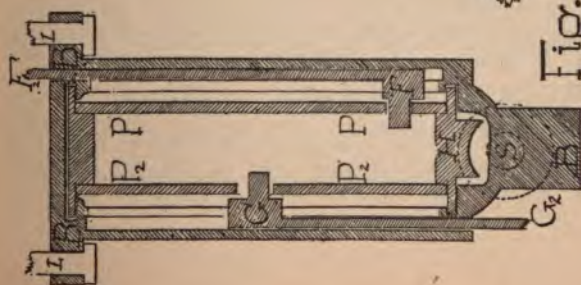
steam steering engine, having no relation in amount to the force exerted on the lever in the pilot-house.

4th. Arrange simple accessible means for throwing the automatic engine control apparatus out of action on the shortest notice, allowing the engine to be worked by hand as at present, using exactly the same principle by which the steam steering gear is disconnected, leaving the tiller to be worked by hand in case of necessity.

The consumption of coal, the amount of steam used, with the speed constituting "full speed" for the time being, will remain entirely under the control of the chief engineer, as at present.

There is one mechanical difficulty that interferes with this plan at present. It is believed that, as soon as called for, a way will be found for its elimination. All steam steering engines are designed for use with a wheel in the pilot-house, making one or more turns to move the valve of the steering engine its whole travel. This has allowed a worm and gear motion to be applied to the valve stem, so that the power available for moving the valve is great, and, therefore, in all steering engines no particular attention has been paid to reducing the power required to move the valve. The plan proposed for using these engines as regulator engines will require an easier movement of the valve than is usual with commercial steam steering engine valves. Manufacturers will be able to produce easy moving valves when once in demand; the more readily that as the regulator engine in this plan has to move only two light valves instead of a heavy rudder subjected to violent jerks, a very small, lightly made steam steering engine will handle the engines of the largest battleship.

Let it be assumed for the time that the friction and resistance to motion of the valve of a steam steering engine has been so reduced by good workmanship, with properly designed valves, that the motion of the pilot-house lever of the ordinary form of engine telegraph through an arc of  $90^\circ$  will give a motion of six inches, the whole travel, to the valve of a small "regulator" engine in the engine-room. Then it necessarily follows that the sliding frame or regulator can be made to follow the motions of this valve exactly, by means that are thoroughly tested and reliable. Suppose the drum of the steam steering engine be attached to the shaft shown in SS, Fig. 1, which, by means of the worm



2  
Fig.

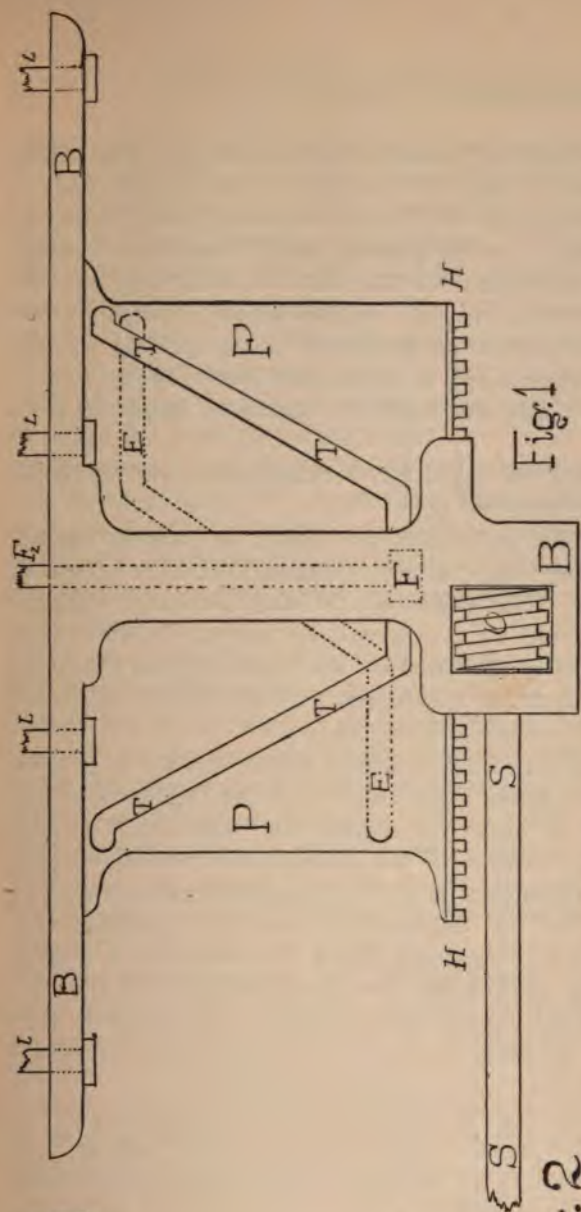
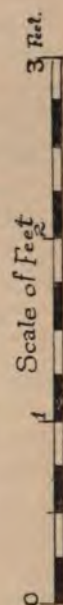


Fig: 1

# AUTOMATIC ENGINE-CONTROL REGULATOR





wheel  $O$  and the cogs  $HH$ , gives a rectilinear motion of say three feet to the plates  $PP$  and  $P_1P_2$ , sliding in bracket  $BB$ , Figs. 1 and 2. The movements of the rod  $F_1$  connecting with the throttle are governed by the guiding slot  $TT$  and cam  $F$ , Figs. 1 and 2. The movements of the rod  $G_2$  connecting with the valve of the reversing engine, or, preferably, directly to the links of the main engine, are governed by the guiding slot  $EE$  and the cam  $G$ , Figs. 1 and 2, in the plate  $P_1P_2$ , Fig. 2.

(Two separate guide slot plates are shown to bring out principle.)

The figures show the regulator in mid-position with the steam shut off and the links half up.

In the sketch the guide-slots are shown as parts of straight lines, for simplicity; they would in practice be easy curves to give best results. The shape of the slots and their relations to each other would be determined by the particular type of engine, but would be designed for the most efficient and safest handling. The speed of the regulator could also be governed so as to prevent reversing too quickly.

The location of the regulator engine would be such as to allow the shortest and simplest connections with the engine-room telegraph. It could be under the engine-room floor or where least in the way. The location of the sliding frame would be close to the engines, where least in the way, against a bracket shelf on a bulkhead, under the engine-room floor, or overhead—the location, except for convenience, being immaterial, as it is to be moved by gearing and shafting from the drum of the “regulator,” which can be given all the power needed. The motions from the cams to the reversing engine and the throttle are communicated by bell-cranks or other suitable connections.

To the regulator may be attached projections which will ring as many bells as required at every change of speed, with arrangements for disconnecting all bells when quiet is desired, as in seeking or avoiding an enemy in a fog or in the dark. Bells governing the firing under the boilers can also be worked for routine changes.

The auxiliary machinery, such as circulating and air pumps, can be controlled with but little trouble by additional slots and cams. In fact, all routine movements now performed by hand

successively can be arranged to take place at the exact time required for efficient working without the possibility of mistakes.

Speed recorders can also be attached to the "regulator," which will give "hodograph" or speed curves, as decided by the position of the throttle, on a slip of paper worked by clockwork and tracers, using the principles of the "barograph" and ordinary engine "indicator." This will avoid the necessity for constant notes of changes of speed, while it will give an accurate record for a watch or for a week, from which the important data may be taken for entry in the log-book.

The speed of the regulator with the movements of the throttle can be so adjusted by experts that the possible danger to the main engine which might result from carelessness or incompetence in working by hand, can be entirely avoided. Even the water-valves may be opened automatically in starting the engine from rest.

No provision is made for the sending of any return signal to the bridge while working automatically, as the motion of the engine will show on the "engine indicators" in the pilot-house, and will be the best and surest indication that can be devised. When the automatic control is disconnected, the motion of the answering pointer on the engine telegraph will then be in operation and will serve as a signal that such change has been made.

In case it be assumed that the engine telegraph cannot be made strong enough, or the friction of the valve with its resistance reduced sufficiently, the valve on the regulator engine can be made to move by a lever of sufficient power, connected with the valve by means similar to, but lighter and simpler than the connections to the steering engine in the steering engine compartment.

If the plan has been carried out properly in the original design, as long as all parts were in adjustment with everything working properly, no more care or attention would be required by the regulating engine than by the steering engine. It would be possible to lock it up, with only occasional visits for inspection. The work of the regulating engine would be less frequent than that of the steering engine when under way, besides being also much lighter in character. There seems no reason why it should receive any more attention or require even as much care. In case of anything not working properly or any adjustment being



The sketches accompanying this paper are, therefore, to be considered as designed to exhibit principle and not for actual construction. The proportions are chosen to show parts, and not the exact sizes of those parts or their relations to others.

The practicability of working the regulator or even the engines by other than hand power or steam is not considered sufficiently tested to warrant its recommendation. When vessels are steered by electricity as much as they are with steam, it will be time to use that method of handling engines, and by the same mechanism used to control the rudder.

The location of control points on board a man-of-war is an important question. In general, for fighting purposes, conning-towers will be placed as far forward as possible where the view ahead is least obstructed. On the other hand, the efficient working of the guns requires that the gun fire shall be unobstructed. The chance of being hit by enemy's projectiles calls for a low position, with a shape to resist serious damage as much as possible. The compromise will probably be that the conning-tower will be hemispherical, with a tunnel entrance from the upper deck, and that its location will be abaft the forward guns and forward of the mast and smoke-pipe. It will probably have just enough elevation to allow the view to be unobstructed. A second conning-tower will probably be placed in a similar position aft. It may also be deemed advisable to have a conning place in an armored top on account of the many advantages of the elevated position. When not in action, a well equipped bridge, pilot-house and chart-room will be located about in the position given above to the forward conning-tower. These questions, involving the exact control points, will be determined by the type of vessel and need be no further considered in this paper, since wherever the engine telegraphs are located in the design of the vessel the same leads and connections would be suitable for the automatic control of the engines from the same points, with the same appliances for throwing out of gear the apparatus not in use at the time. Any point suitable for an engine telegraph will be equally suitable for the use of automatic control from that point.

This plan of automatic control of engines from a distance, besides being adapted for exact and delicate handling of vessels, is also applicable to handling turrets. The lever being in the

turret, where most convenient, with the engine working the turret below out of danger and where it will give the best results. The connections being the same as at present, by means of a sliding collar on the spindle with a diminutive regulator below the turret, as described for working the main engines. The regulator could be overhead, and its travel, with accompanying delicacy of handling, arranged to any degree of fineness desired. As all the working parts would be small, many parts could be combined, with resulting compactness. The turret could be made to move as slowly as desired without jerking, owing to the regulation of the amount of steam, or as rapidly as the engine could work safely,

The following is a résumé of this plan for the automatic control of the main engines of a vessel of war:

1st. The use of as direct and as frictionless connections as practicable for transforming the motion of a lever in the pilot-house into motion of the valve of a small, light-working steam steering engine used as a regulator engine in the engine-room of the vessel, so that the valve follows exactly the motion of the lever.

2d. The following of the motion of this valve of the regulator by a drum, exactly as is done by the steam steering engine.

3d. The transformation of the motion of the drum of the regulator engine into the rectilinear motion of a sliding frame or regulator, so that the latter follows exactly the motion of the valve and, therefore, the motion of the lever, but over a longer space and with more power, in the same manner that the tiller and rudder follow the motions of the steering-wheel.

4th. The transformation of the motion of the regulator to motions of two rods, one of which controls the motion of the valve of the reversing engine, or the links of the main engine, and the other controls the position of the throttle valve of the main engines. This also produces the motions requisite for ringing bells anywhere, and for starting in operation and slowing auxiliary machinery necessary to and dependent upon the working of the main engines, to any extent deemed advisable.

5th. Readily accessible means for throwing the automatic control out of gear, leaving the engines to be worked exactly as at present.

As to its originality, it can be said that the plan proposed is original with the writer in so far as it is applied to handling of



engines on board large vessels by means of the steam steering engine principle. That is believed to be entirely new and is believed to be the keynote of success. As to the idea of working the engine direct without a second man to receive a signal, that is done in thousands of locomotives in every-day use. As a matter of fact, it will require less manual power in the pilot-house of a large steamer to work the engine by means of the regulator described in this paper than it does to work the massive lever in the cab of a railway locomotive, in spite of the longer connections and the greater size of the vessel's engines.

The locomotive idea has been applied to direct working of the engines of small vessels with double engines, and there are several patented devices in successful operation.

I know of no patents, existing or future, covering the ideas advanced, and think the plan capable of development.

The following are some of the advantages which would attend the adoption of automatic control of engines:

1st. Avoidance of errors and accidents due to misunderstanding or poor execution of signals from deck.

2d. Quicker working of the main engines, since the motion of one lever on the bridge acts directly on both the reversing engine and the throttle. The engine will be worked in the same time it now takes to make the signal.

3d. Complete control of the engines while steam is in the boilers, in case an accident to a steam-pipe or the draught makes the engine-room untenable, or a serious incident, such as being rammed or torpedoed, forces those in the engine-room to leave their post.

4th. Greater efficiency in handling the engine with increased security from accidents due to imperfections in machinery or its working, by allowing those now stationed strictly on the engine platform when under way to move freely about the engine-room, inspecting all parts more frequently.

5th. Relief from constant strain of those now stationed to watch engine-room telegraph when under way.

6th. Adaptability to any form of engine without lessening usefulness of present system of reversing engines by hand.

7th. Ready return to existing style of working engine when so desired.

8th. Adaptability of present connections of engine telegraph to new system of working engines without any increase in number of parts or the use of untried systems of connection.

9th. Exact and delicate adjustments of speed to suit the exigencies of squadron evolutions in close order.

I offer this plan with a great deal of diffidence for discussion by the Institute, and in the hope that something may be done to develop an idea in what I believe to be the right direction. No one has ever complained of the introduction of small engines in place of manual power for reversing ships' engines. This plan, with all of its imperfections, is a further step in the same direction. It is bound to come, and the sooner the better.





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### A SYSTEM OF AIMING DRILL.

BY ENSIGN PHILIP ANDREWS, U. S. Navy.

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Blunt's Rifle and Carbine Firing contains many valuable suggestions and rules for target practice with small arms, among them the following exercise for sighting:

"Sight three times at a movable target which is each time brought into the line of sight without moving the piece." Following this rule, the triangle drawn through the three shots, if small, will indicate regular, but not necessarily correct sighting, since there may be a constant error. Blunt recommends that the instructor, after drawing the triangle, himself see whether the center is in the line of sight; but this affords no criterion, since the instructor's aim may be no better than the man's.

The following method of sighting drill is believed to be an improvement on this method. It was first suggested by the writer in 1891, and was then used on the Chicago, and has since been used to some extent.

The target board and rifle should be fixed throughout the drill in absolutely the same position.

Let each man sight three times at the movable target after he understands theoretically how to sight.

Connect his three shots so that they may be identified, and number the resulting triangle.

The number of shots given each man is immaterial, as the mean point of impact of his shots can be readily found, but three shots will be ample.

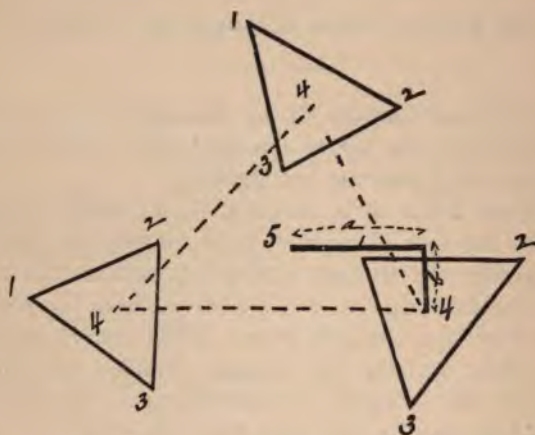
After ten or more men have shot (and about ten shots will be a long enough drill), find the mean point of impact of all the shots fired. This point will be almost exactly where the sights



of the rifle really point, and is certainly much more accurate than the sighting of any one or two men.

The mean point of impact of the shots of any one man compared with the position of the mean point of impact of all the shots will show what the errors of that man are, whether his sight is coarse or fine, and whether he sights from one side or the other of the rear sight.

The following figure illustrates roughly the method to be followed:



- 1, 2 and 3 show three shots of any one man.  
 4, 4, 4, show mean point of impact of the three shots.  
 5 shows mean point of impact of the shots of a number of men.  
 a shows horizontal error of a man's shooting.  
 b shows vertical error of a man's shooting.

This method shows with considerable accuracy the absolute errors of sighting, its accuracy increasing with the number of shots taken.

An approximate idea of the progress during drill may be had by having the best shots start, to correct glaring inaccuracies of aim in those following.

Experience shows, however, that the same man, from carelessness or other cause, does not sight the same from day to day, so this brings up the subject of records for each man, to finally show, after a reasonable number of observations, what his usual errors are.

This may be done in two ways:

First—By keeping a tabular statement of each man's vertical and horizontal errors from the mean point of impact each day and averaging them, say weekly or monthly, in the meantime making daily corrections of evident inaccuracies in aiming.

Second—After the usual determination of the mean points of impact of each man and of all of them, place each day's final mean point of impact (the point at which the rifle aims), coincident with the bull's-eye of a figure of a short-range target (which for convenience may be on transparent paper) and mark each man on the scale of 5 for a bull's-eye, and 4, 3 and 2 for the other rings.

The figure of short-range target should be of a size proportioned to the mean vertical and horizontal deviations of the rifle used at the distance selected.

The second method furnishes an excellent record of a man's general improvement, but would not show the components of his errors; the first method would seem to be preferable for purposes of correction, since it shows a man's vertical and horizontal errors; and thus, after a reasonable number of shots, just what kind of a sight a man uses.

I have found that a long range is preferable to a short one, the aiming appearing to be about as good at 100 feet as at 50, and that the competition among the men, by having them understand the system and appreciate the comparison it makes, engenders a spirit of rivalry akin to that in real target practice.

It may be pointed out that aiming drill may be profitably had with a 6-pdr. or 5-inch gun on poop or forecastle, or with the turret guns, clear spaces of 30 to 100 feet being generally obtainable.

Aiming drill is beneficial for general sighting improvement, but the main and secondary battery guns should be used, where practicable, for sighting drill, to improve the aiming of these weapons.





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HONORABLY MENTIONED.

MOTTO : "Historically, good men with poor ships are better than poor men with good ships."

THE ORGANIZATION, TRAINING, AND DISCIPLINE  
OF THE NAVY PERSONNEL AS VIEWED  
FROM THE SHIP.

By LIEUTENANT WM. F. FULLAM, U. S. Navy.

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It is admitted that the personnel of the Navy should be reorganized. At the last session of Congress a joint commission was appointed to investigate the matter. The commission devoted much time and study to the subject, listened to the views and claims of all classes, and took a large amount of testimony representing all shades of opinion. From a careful review of the proceedings of the commission, it would appear, with all due respect, that considerable time was given to the consideration of recommendations having a very remote bearing, if any, upon naval efficiency. The claims of individuals and classes were urged with greater energy than were the demands of the Navy as a whole. The interests of distinct corps were pressed to the front with a persistency that often sent the consideration of general fighting efficiency to the rear, or hid it beneath a load of bewildering arguments.

Notwithstanding the fact, however, that some of the most important elements of naval efficiency were obscured by irrelevant testimony, the commission demonstrated that it had in many instances carefully weighed the conflicting claims put forth by corps and individuals, and had formed an intelligent and generally correct idea regarding many points that have been the basis of contention for years.

But after the testimony was all in, the verdict of the commission—the jury before which the case had been exhaustively tried



—was not satisfactory to many individuals and classes. The bill formulated by the commission contained certain provisions that would undoubtedly bring hardship and disappointment to some officers, who could not, therefore, reasonably be expected to advocate its passage. In such cases concessions should be made if possible. But there were others who opposed the bill, and who openly boasted of their determination to kill it, not because it injuriously or unjustly affected them, but because it did not grant them concessions which in some instances would be mischievous and injurious to the service at large. In such cases opposition was unjustifiable, and compromise would therefore be inexcusable. There is a limit beyond which the claims of individuals must not take precedence of the claims of the service.

It is in this phase of the question that we find the most serious obstacle to naval reorganization. The tribunal whose judgment is to be final must distinguish carefully between personal rights and service rights. Harmful precedents and selfish personal schemes, pushed by influences ever at work, must not be permitted to creep in under the guise of "naval reorganization."

The difficulties that beset the subject would be removed if the commission could sit on board ship, where the truth, the whole truth, and nothing but the truth would be easily obtainable—where the wheat could be separated from the chaff. The fallacy of many theories that savor of the shore would be plainly seen. Deceptive arguments, misleading statements, and absurd claims would be pitilessly exposed. It is from the deck of the ship that the problem should be considered, for it is plain that the ship is the unit of naval power and the true basis of naval efficiency. An organization that secures efficient ships will secure an efficient navy. If the ship is forgotten in formulating measures of reorganization, more harm than good may result from the consideration of the subject. It is to be hoped, therefore, that in the rush of individuals and classes for recognition during the cry for naval reorganization, the ship, the men, and the methods necessary to insure fighting efficiency may be kept ever in mind.

A brother officer to whom the remark was made that "it is very unfortunate for the Navy that questions relating to the personnel cannot be discussed and settled upon the true basis of ship efficiency just as we discuss questions relating to material, speed, and armament," replied that it was "simply because when

we deal with the personnel we trespass upon certain so-called 'vested rights.' This is the whole thing in a nutshell: "vested rights" of a more or less personal nature form the principal obstacle to the proper organization of the Navy—an organization that would best meet the demands of a state of war.

But, plainly, if this principle of "vested rights" is to be recognized without limitation and for all time; if considerations of good fellowship are to rule inexorably; if men, material, and methods no longer useful are to remain forever; if the voice from the ship in commission—from those who take note and see clearly where the evils lie—is not to be heard; in short, if the truth regarding the unit of a navy's strength—the ship—is not to be known, there will be in the end, even after naval reorganization so-called is effected, far greater need for Naval Service Reform than there has ever been for Civil Service Reform in this country.

It is, therefore, with all due respect for "vested rights" and with courteous regard for the personal feelings of individuals, that it is proposed in this paper to handle the question of naval reorganization on the basis of what is deemed best for the ship. It is proposed to discuss the people on board ship, their duties there, and their relation to ship efficiency. In no other way can the substance of the matter be reached.

#### PROMOTION OF OFFICERS.

Three systems of promotion have been proposed as substitutes for that now in operation, all designed to bring officers to command and flag-rank at a reasonable age:

1. Promotion by selection.
2. Age retirement in grades.
3. Retirement by selection.

Each of these systems has its advocates, and each has its advantages and its defects. It is not deemed necessary to discuss these systems at length in this essay, for the simple reason that this subject is certain to receive its fair share of attention. Officers are on the ground ever ready to work in this field of discussion. There are other important matters that are likely to be forgotten, and it is to these that the writer wishes to devote particular attention. It is to be hoped, however, that whatever the system of promotion may be, it may not have the tendency to bring



political, personal, and social influences to the front in a manner that will be harmful and demoralizing to the Navy. It is possible, to be sure, that some individuals are too pessimistic and unnecessarily panic-stricken in this respect. It may be that their fears are groundless, or greatly exaggerated, regarding the possible influence of the *salon* in Washington, and that the tendency to resort to the Mme. de Staël system of influencing naval legislation and preferment at the national capital might not become so prevalent as they claim it would. But, nevertheless, it would be unwise to create among naval officers the impression that unless they get to Washington, or manage in some way to work up a "pull," their chances of advancement may be lessened. It is important that a system should be decided upon that will encourage officers to devote themselves zealously to their profession and to the performance of their duties in order to win reputations that will entitle them to promotion.

In connection with this question of "influence," the writer has heard the theory advanced of late, in all seriousness, that, whereas an officer in the junior grades who exhibits ability, zeal, and subordination, or who attaches himself to the fortunes of some officer of high rank, may get desirable duty, increase his professional knowledge, and gratify his ambition, he must depend upon something else when he reaches command and flag rank. That in the upper grades where he is no longer sought after by seniors who wish to utilize his intelligence, he must depend upon "influence," very often, to secure a desirable command—that such a detail may go to the officer of inferior talents and a superior "pull." In self-defense, therefore, it was argued, an officer must devote himself sooner or later to the cultivation of "influence."

This is a very delicate subject, but it cannot be altogether avoided in considering naval reorganization. Such a theory as the above, if advanced openly, as it has been, must be openly condemned and guarded against. In the attempt to increase the efficiency of the Navy, such matters must be handled without gloves. The principle must be laid down, that conspicuous professional services and ability in connection with ships and men—not "influence" or "pull," not services in society—shall secure promotion and reward for a naval officer.

In avoiding one danger, however, we must not run headlong into another. It may be possible to avoid the baneful effects of

"influence" without adopting a system that places a premium upon mediocrity, and that takes no account of ability or personal fitness. Such is the system that makes age or youth the sole criterion of advancement—a system that exists in no civil profession. Ability, physical and mental activity, should have some weight, and years alone do not determine this. One man at forty-five years of age may be far more active and zealous than another at thirty-five. Men differ from horses and wagons in the matter of wear and tear, because brains and personal habits enter with men to determine their usefulness after a lapse of years.

"Command rank young" is a thing to be desired, but it is not by any means a panacea to be secured at all costs. To be sure, any man will be benefited by reaching command rank at a reasonable age. But command from the cradle to the grave would result in conspicuous failure with some men, while others who attain command late in life will be conspicuously successful. After all, it is the man himself that settles the matter. The brain and practical ability, not years nor "influence," should determine the advancement of a man in any profession—even in the Navy. There must be some competition, some reward for energy and worth, some tendency to spur up the laggards. All men are *not* equal.

#### OFFICERS AFLOAT.

Naval reorganization, as it affects officers, should surely be based upon an examination of the ship and its fighting efficiency. The question of promotion is very important, tending, as it may, to infuse spirit and energy into the service. But there is another important matter bearing upon the chances of a ship in battle—the number and kind of officers on board. Shall "vested rights" forbid an examination of this subject before our ships are called upon to face an enemy?

The statement has been made that there are too many line officers on board our ships. This statement has sometimes proceeded from a careless consideration of the subject, sometimes from ignorance, and again from malice. It is a very serious matter and should not be passed over lightly. A careful examination of the conditions existing in modern ships will prove that there are not too many line officers, and that in some instances there are too



few. Guns are now so scattered and separated from each other by bulkheads and turrets that more officers are needed to control a ship's battery than in former days. Means of communication are very incomplete, and parts of a ship's battery are entirely cut off from the control or view of the captain, executive, and divisional officers. The casualties likely to arise in these days of rapid-firing guns must not be forgotten in determining the number of officers needed to manage the armament. The result of an engagement might hang upon the presence of an officer at a certain gun or torpedo. It is very remarkable that in these days when it is admitted that the gun is the key to the situation, there should be an attempt to reduce the number of line officers. Such a scheme would certainly play into the hands of an enemy. In time of war the number of ships will be largely increased, and there will be too few line officers of the regular navy available to control the batteries afloat and to drill a horde of recruits into proper shape in a short time. That any man wearing the uniform of a naval officer should propose such a plan is amazing, to say the least.

It can be shown that even now, on a peace footing, there are not enough line officers on board some of our ships. It often happens that the powder and torpedo divisions are inadequately supplied with officers, owing to the fact that the whole length of the ship is included in these commands, and one or two officers cannot control the whole. The supply of ammunition is of vital importance, and the heterogeneous character of the powder division requires the presence of enough officers to secure confidence in every compartment.

When we stop to consider a ship in battle, it is plain that there should be as few officers as possible on board whose duties are restricted within narrow limits or confined to matters that do not materially affect the result of the fight. The perfect system would require that every officer on board should be available for any service in connection with the offensive power of the ship. This system should be approached, at least, if it cannot be fully realized.

If the paymaster and his clerk were line officers, there would be a gain of two officers available for duty in the powder, torpedo, or gun divisions. It is perfectly plain that a lieutenant and an ensign could easily perform the duties of a paymaster and his

clerk respectively. Their education, their knowledge of naval material, their contact with the men, and their general observation of the needs of the service would give them many advantages over paymasters. The latter are appointed from civil life, and have in the beginning no knowledge of the Navy, no acquaintance with naval material or methods, and little opportunity to acquire a sufficient knowledge to render them available for general service afloat. Here again we come to the question of "vested rights"; but we also find ourselves face to face with fighting efficiency, and we must decide which is to be ignored. There are no difficulties whatever that need prevent the assignment of line officers to the duties of paymasters, and nobody can deny that the efficiency of a ship for battle would be increased thereby. The idea that several young men should be annually discharged after a six years' course at the Naval Academy, while young men from civil life, with no naval training whatever, are admitted into the Navy as full-fledged commissioned officers, is an absurdity that may well be pointed out in an era of naval reorganization. Education and training are thrown away, technical and professional knowledge is discounted, and availability for naval service is ignored! In the place of young men who possess these qualifications, we take others who lack them all!

As regards engineer officers on board ship, it would be better if they were reduced in number and assigned solely to the duty of superintending the machinery. It has been suggested to consolidate the construction and engineer corps, forming one corps devoted to the work of designing ships and machinery, and supervising engines on board ship. Spending a portion of their time in service afloat, these officers would get the practical experience so necessary in the design of ships of war.

The active and purely mechanical duties of running the engines could be done by machinists and warrant officers, which arrangement would give deserved promotion to men in the engine-room. Such a plan would assign the commissioned engineers to congenial duty, and leave the work that requires no scientific training to the class of men who do such work in the merchant service and in civil life. The recent order of the Navy Department giving chief machinists engine-room watch is in line with this argument and merits approval.



It is only fair to point out that engineers and machinists can be more easily recruited in time of war than can line officers. The latter are not found in the civil pursuits, and officers of the merchant marine are no longer available, because of their complete ignorance of modern weapons, tactics, and naval strategy. In civil life, however, there are thousands of men engaged in the design and operation of machinery who would be perfectly available for service in the Navy in time of war. And in these days of armor and protective decks, the casualties in battle among engineer officers will be very few. Modern guns with their flat trajectories will seldom penetrate far below the water-line. From the accounts of the war in China, it would appear that the motive machinery of ships, and those handling it, were seldom disabled. It simply demonstrates that a surplus of engineer officers in time of peace is not necessary to provide for a state of war nor to fill vacancies in battle.

The few duties now performed by marine officers afloat could be assigned to line officers, who would also be available for all other naval work. Line officers belong to the "military branch" of the service, and must be competent to perform all military duties. They have a military training, and surely must be competent to do work formerly done by marine officers who entered from civil life, often with no military experience or training whatever.

When naval forces are landed for service on shore a line officer is usually in command, especially if the force is large and the duty correspondingly important. If line officers are competent to assume command of a *large* force in time of active service when weapons are used and men handled under fire (and this duty may fall to them at any time), they must surely be competent to take charge of a *small* force like a marine guard for like service; and still more reasonably must they be competent to control their men on board ship where there is no unusual emergency. Officers in a military service are supposed to seek duty in case of actual hostilities, or in case of threatened trouble afloat or ashore, and line officers are not exceptions to this rule. And as this service with men under arms, as infantry and artillery, has always been, and must always be, required of naval officers, they should be prepared for it—they certainly cannot afford to admit their incompetency nor their unwillingness to assume such responsi-

bilities. If the military duties and the supervision of the "guard" are left to the line officers afloat, they will be the better prepared for the duties that the service often demands of them. To claim their inability or unwillingness to do such work on board ship, and require them to do it on shore, where ignorance or lack of interest may be fatal, is a manifest absurdity.

The marine officer afloat is another case of "vested rights" that interferes with general naval efficiency, because a line officer in his place would certainly be more generally useful. The line officer must be willing to manage the military part of the Navy. He cannot gracefully admit his helplessness or his need of assistance in this branch of his profession. It is a fact that infantry drill and the guard duties in the Navy require less ability and less study than a hundred other duties that fall to a naval officer. A simple drill-book and a simple guard manual are needed—that is all. Unnecessary complexity in these matters has been a great bugbear.

It is unfortunate that some officers are inclined to deny the importance of landing forces. When we consider how frequently our men have been called upon to land in all parts of the world, it would be reasonable to say that a naval officer is quite as apt to be called upon for active service with men under arms on shore as with the ship's battery at sea. It follows that officers must prepare themselves for this important practical work, and must not glory in the fact that they know or care nothing about it.

It has been demonstrated repeatedly that naval officers are fully competent to command companies and battalions on shore, and to direct operations with signal ability. In the recent landing drills of the North Atlantic Squadron, line officers who had never before had an opportunity to witness or practice the new "extended order" grasped the subject at once and handled the bluejacket battalions in a manner that showed a peculiarly intelligent conception of all the practical points involved. The onlooker could not fail to see that the line officer is equal to all military duties, and that the infantry part brings the least strain upon his intellect. Two kinds of military officers are not needed afloat. The marine officer has no *raison d'être*. Officers of *general usefulness* are needed on board ship.

As far as it affects officers, naval reorganization is a very simple matter if the efficiency of the ship is the object sought. There are



too many corps and conflicting interests—a complexity and lack of homogeneity that interferes seriously with man-of-war efficiency. If reorganization is to be of any material benefit there must be a thorough examination of such matters. The main lines of reform have been marked out—proper promotion for those who are mainly responsible for the management of ships and squadrons in battle; the abolition of at least two corps afloat, and the substitution therefor of line officers who are available for all naval duty; the consolidation of the engineer and construction corps, and the assignment of officers and petty officers to the work for which they are best fitted.

Such a plan, which simply goes to the root of the matter, need not interfere with the “vested rights” of officers now in the service, if such rights are deemed of such importance that nothing whatever can be done to disturb them. All officers now on the list may be permitted to remain, and their pay, promotion, and duties may be unchanged—simply stop making any more appointments at the foot of the list and let line officers gradually fall into the places afloat. The result will ultimately be that there will remain only three distinct corps on board ship—the military, the medical, and the mechanical and construction corps.

In discussing naval reorganization it must not be forgotten that it is the duty of the line officer to command and control the whole ship—not simply a part of it. He is not restricted to one department. He may not be acquainted with all the trifling technical details of each department, and it is not necessary that he should be. But there must be some head, some governing mind, to maintain the balance between diverse individual interests and to direct all toward one end—efficiency for war. If the captain of a ship is to have complete command in battle, he must have complete command in time of peace. If he, more than anybody else, is responsible for the result of the fight, he must have more to say than anybody else regarding the system of organization before the battle begins. He is certainly interested in the efficiency of all departments. The whole trend of his duty and training fits him to adjust all the forces that unite to make a ship ready for action. Is there any other officer or individual who is better qualified for this work? Is it better that it should be left to a half-dozen different officers, each of whom controls

only a part of the organization, whose training is limited to a part, and who is inclined to acknowledge no all-controlling power? A general commanding an army properly decides, if anybody can, how much infantry, cavalry, and artillery are needed to conduct a campaign. The captain of a ship, and the officers who are educated for the ultimate purpose of command, must study naval organization in its broadest sense; and their competency to decide upon the general features, functions, and relations of all departments in order that all may be formed into an efficient and harmonious whole cannot be denied. It is for this duty that a line officer exists. If he neglects it, or is not permitted to consider it, who shall take it in hand? Who is more competent, who is more logically the proper man for the work? It is impossible to dodge the inevitable fact that it is the legitimate duty of line officers to exercise general control over the whole subject of naval organization in all departments; they are not meddling when they assume this function; they are not usurping power nor trespassing upon the "vested rights" of others—they are simply performing a "vested" duty, and the one which is most vital to an efficient navy. If each corps of the Navy is made independent and permitted to reorganize itself; if questions of rank, titles, and pay are to be decided exactly as the several corps may demand; and if certain matters which are of comparatively trivial importance in their bearing upon naval efficiency are to monopolize the attention of Congress, naval reorganization will be a dismal failure. The ship, and the true means of making it ready for battle, must be kept in mind; and it should be the duty of all who have the interests of the service at heart to demolish harmful and selfish schemes and fix the attention of Congress upon the problem of securing the officers, the men, and the methods that will most surely contribute to victory when the drum next beats to quarters for the honor of the flag at sea. In the grand charge of individuals and classes upon Congress to secure legislation, let somebody remember the motto, "Don't give up the ship."

#### TRAINING OF OFFICERS.

No radical changes are necessary in the present system of training officers. The course of instruction at the Naval Academy has been developed with an intelligent conception of the needs of



the service and with due regard to the march of improvement in naval science. Many criticisms aimed at the school are hastily considered, and often proceed from erroneous ideas as to existing conditions. In some cases the changes suggested by well-meaning critics would result in a vast deal more harm than good.

The proposal to fix the age of admission at between fifteen and seventeen years, to extend the academic course to five years, and then to graduate the cadets as ensigns is a good one. In other respects the present curriculum and the general scheme of instruction are excellent, and can with difficulty be improved upon.

There are many objections to the present plan of sending the cadets to sea for two years before final graduation. One objection, not often noted, is that cadets necessarily feel that they must keep up the academic studies in order to prepare for the final examination; and as this examination is in no respect in advance of the one passed at the end of the four-year course, the cadet gains little in preparing for it. His attention is often drawn from the practical duties on board ship, and from careful observation of important professional work, to be concentrated upon books and theoretical studies. He sometimes asks to be excused from watch in order that he may get time to study, on the plea that some of his classmates who are permitted to devote their time to their books may gain an advantage thereby and pass him on the examination. This competition does not yield good results for this reason. It will be better if the graduate goes on board ship feeling that his status is assured, or that it may be improved by devoting himself exclusively to active professional duties rather than to books.

The vital importance of the Naval War College is now admitted. The institution has at last been given its proper place after many narrow escapes from determined enemies, whose reasons for attempting to kill it are beyond comprehension. The unanimous verdict of the officers who have received the benefits of the course, and who have noted its relation to naval efficiency, is sufficient proof of its value. It directs the minds of officers toward the methods of using naval material most effectively for purposes of war. Officers have devoted much time to the invention and manufacture of guns, and to the design and building of ships. To study how guns and ships should be directed against

an enemy is the most vitally practical part of a naval officer's training, and it is to this subject that the Naval War College is devoted.

In this connection it should be noted that there is at present no system by which officers may become well acquainted with the coast of the United States. It is perfectly possible for an officer to complete his career in the Navy, passing from cadet to admiral, spending nearly all his time on foreign stations, visiting comparatively few home ports, and thus getting a very imperfect idea of the coast of his own country. This is a serious defect in the training of officers. It is of the first importance that they should have a complete knowledge of the strategic features of our coast, and be perfectly familiar with the navigation of the inland waters and harbors. An intimate acquaintance with these matters is essential to the proper defense of the coast against an enemy. Such an important subject should not be left to chance. Naval routine in time of peace can easily provide proper instruction for all officers in this respect.

And there is now no systematic instruction of officers in piloting and conning ships. The many practical and valuable rules known to officers who have given particular attention to this subject, and who have had experience in coasting and piloting, should be known to all. An officer must not be left to pick up such things in a hap-hazard manner. He may any day be called upon at short notice, and with no previous experience whatever, to handle and pilot a ship under circumstances demanding perfect self-confidence and readiness of resource. He may in time of war be assigned to a part of the coast which he has never visited and of which he knows nothing. In such a case he cannot act with good effect against an enemy.

To provide for the instruction of officers in this particular, a ship of light draft should be assigned exclusively to this work. It should cruise for six months each year between Maine and Texas, three summer months on the northern coast and three winter months on the southern coast, and should be accompanied by a squadron of torpedo-boats with which to penetrate all inlets and inland passages. Every officer in the Navy should be sent to this ship at some time during his early career. The instruction should be strictly confined to the practical subjects of piloting and naval strategy, as developed by a careful examination of the



coast, and from data furnished by the Intelligence Office and War College. The President of the War College should have the general direction of this cruise, during and after which the discussion of problems of coast defense and attack should be encouraged, and the regular course should be completed by instruction at the War College as at present. Officers should in turn be permitted to pilot the ship, and all recognized precautions and wrinkles used in piloting should be systematically taught.

There can be no question that officers would take great interest in such work, and a year devoted to it would be well spent. The result would surely be felt in time of war—officers would display more dash, and exhibit a better knowledge of the means of harassing an enemy. Ships and torpedo-boats will be used with better effect if officers are given the advantage of such experience. This extension of the course of instruction would increase the objections to admitting foreign naval officers to the Naval War College.

#### WARRANT OFFICERS.

The warrant officers are entitled to consideration in the reorganization of the Navy. Standing between the grades of commissioned and petty officers, their relations to both are intimate and their duties are important. It is fortunate for the service that the Navy Department decided not to abolish boatswains, but to assign them to large ships where they are much needed. The boatswain came near being the first victim of the pernicious theory that seamanship is a lost art. It may be natural that those who are quite ignorant of the demands of man-of-war routine should fail to appreciate the fact that the sail is the shadow rather than the substance of seamanship. The Navy is suffering too much from such theories.

In the event of war the warrant officers would necessarily play an important part. Their thorough acquaintance with naval material and weapons, their intimate knowledge of the men, and their experience in controlling them would make the warrant officers the most valuable of all the men who would be available to recruit the lower grades of commissioned officers. Their efficiency in such positions would surely be greater than that of men of a higher social and intellectual standard who lack the

practical knowledge, who have served but little afloat, or who have been out of the Navy for a considerable period. The line of the Navy cannot be so well recruited from the beach as from the ship, from landmen as from seamen, and it is high time that this fact should be recognized.

It is more than likely, therefore, that with the great expansion of our navy which a state of war would entail, the warrant officers, and perhaps some petty officers, of the regular navy would receive commissions in the volunteer service, and that many of these men would return to their previous duties at the close of the war, just as hundreds who were officers of high rank in the volunteer army during the civil war returned to the subordinate grades when hostilities ceased.

And there is another all-sufficient reason why a proper interest should be taken in the warrant officers. It is to this grade that the enlisted men of the Navy must look for their main hope of promotion. It is recognized nowadays that a line officer of the Navy requires an academic or college education. It is not necessary to argue this point. Such a fact does not make the Navy an aristocracy any more than the fact that a man must study law before he can be admitted to the bar makes lawyers aristocrats. There are certain callings that require a thorough education, and the Navy is one of them. The Naval Academy is a thoroughly democratic institution. It might be well to provide that all candidates should be chosen by competitive examination in order to eliminate personal and political influence. But to lower the standard of the school, or the standard of a naval officer's training, would be an injury to the service that is not justifiable on any ground whatever.

The Army and Navy differ in some respects, and it is submitted that it is more practicable for a man to rise from the ranks to a commission in the Army than in the Navy. In the latter case, the environment is not conducive to study; the opportunities, the leisure, and the facilities for self-education on board ship are by no means so good as they are on land. And the numerous duties of a more or less scientific and diplomatic nature that fall to the lot of a naval officer demand that he shall be very carefully trained.

It is well enough to recognize the right of an enlisted man to a commission, and in this respect the Meyer Bill should become



ment, steadiness, reliability, daring of the highest quality are all there, and *evolution in this respect has been toward perfection.* What, again, of his loyalty and discipline? There is in this respect *no difference now between the bluejacket and the marine.*" The italics are mine. This declaration is full of significance. It merits study. Just at this time, when the possibility of war with England is being discussed, the subject is peculiarly interesting.

Now what shall *we* say about *our* bluejackets? Are they now, or are they ever to be, equal to the English bluejackets as "light troops"? Can they not also be made to display "steadiness, reliability, and daring of the highest quality"? And "what again of *their* loyalty and discipline"? Are they, unlike the English bluejackets, inferior to the marines in this respect? If these questions must be answered in the negative, there is cause for humiliation. Line officers are responsible for the training of the men, and to clear themselves from the charge of incompetency or neglect they must be able to answer these questions in the affirmative. There is no alternative. The men of the Navy are, and always will be, just what the officers have made them—because officers are supposed to have the power to mould men at will. It is not sufficient to claim that the material has not been good. In this case means should have been taken to secure better material, and the means of doing so have been pointed out.

From this declaration of an English admiral, we turn to the following statement made by an American naval officer regarding a case where bluejackets were required to do guard and sentry duty: "The men behaved admirably in all respects save one; despite the Utopian theories of certain optimists who argue that marines may be dispensed with, it was found that the sentries and even the petty officers of the guard could not in many cases be relied upon to prevent the introduction of liquor, and this one subject was the cause of much annoyance, and necessitated the most unceasing vigilance on the part of the officers and the police authorities of the ship."

This statement carries with it the following deductions:

1. The presence of the marines on board ship for one hundred years, and the system of discipline practiced afloat, has not resulted in making bluejackets trustworthy.

2. The marine alone can be "relied upon to prevent the introduction of liquor," and if he is withdrawn from ships, or if he is not ever-present as a guard, "the most unceasing vigilance on the part of officers and police authorities" will always be necessary—it is "Utopian" and optimistic to expect a bluejacket to be reliable, and line officers cannot make him so! This is what the statement means, if it means anything. Now the question is: Shall a system of discipline that has resulted in a condition of things so deeply humiliating be perpetuated? Shall our method of training men continue to rest *upon the cardinal principle that bluejackets and petty officers are essentially untrustworthy?* Shall we view this pitiful spectacle with hopeless resignation, and declare in this era of naval reorganization that it is impossible or undesirable to teach a bluejacket to be reliable?

Rather than subscribe to this theory of certain pessimists, the writer would greatly prefer the "Utopian theory of certain optimists" who argue that the line officer of the Navy is quite competent to train petty officers and men to be reliable. In the latter theory the aim is certainly higher, there is less humiliation, and there is a better chance of naval efficiency. There are some admissions which a military man should blush to make, and one of them is that he is unequal to the task of training men to meet the demands of the service. And after trying one system for one hundred years and finding it a failure, he should try another. If an army officer can convert a raw recruit into a reliable sentry in a few weeks, it is not so very "Utopian" and optimistic for a naval officer to claim *that he can attain the same result in a few months!*

It is not difficult to account for the fact that some of the bluejackets and petty officers proved to be unreliable in the case cited. They had not been trained for this duty by the prevalent naval system that is reflected in the remark, "Never trust a bluejacket, sir!" If thirty ships in the Navy followed the plan of *not* trusting bluejackets, one ship may not succeed perfectly in pursuing the opposite course. And it is only fair to say in behalf of the bluejacket, that marines have not always been successful in preventing the smuggling of liquor. Rum has often been passed through a double line of marine sentries in a navy-yard. Marines have been known to do it themselves. Men have been known to leave a ship without permission repeatedly, pass two



cordons of marine sentries, scale a navy-yard wall, and return on board again without being caught, *even after the sentries had been told to look out for them!* Despite certain pessimists, there will be "no difference between the discipline of the bluejacket and the marine" when the former is trusted as much as the latter—*when the naval system of training demands trustworthiness.*

#### SHIP-WORK AND CONDITIONS AFLOAT.

It goes without saying that naval officers, to make men satisfied with the service and to make a ship as efficient as possible, must devote as much attention to the well-being of their men—to their "uniforms, food, shelter, and pay"—as did the Emperor Napoleon in the case of his men. There is plenty of evidence that these matters do not receive proper attention. The system of messing, for instance, is so bad, so wasteful and complicated, involving so many "caterers" and the loss of so much money, that essays might be written upon this one subject—and yet the system remains. The truth is that officers are not in the habit of analyzing closely enough all the matters affecting the men's comfort and their morale. And in the matter of ship-work there is a degree of indifference, or a failure to appreciate the necessity for decided reforms, that is truly astonishing. Nothing so seriously threatens the *esprit* of the men, nothing is so discouraging and demoralizing to them, as the neglect to reduce the number of idlers on board ship. The working force, as a rule, is ridiculously small in proportion to the size of the crew. In a recent instance, out of a complement of about 300 men, sixty-seven men—half of whom were young apprentices not fit to do a man's work—toiled for three days in a hot tropical sun passing 450 tons of coal on board. When the same ship was docked later on, forty-six men were counted scraping her bottom under trying circumstances. In both cases there were about thirty able-bodied marines on board ship, half of whom were standing sentry duty in four watches, while the other half were off duty for the day. And yet we are told that the *marines* are so overworked that *the limit of human endurance has been reached.*

To view this picture and not be impressed with the necessity for a change would be to ignore a matter the importance of which cannot be overestimated. In time of war such a state of

things could not be tolerated for an instant; why then should it be tolerated in time of peace? In neither of these cases were sentries needed. Petty officers could have been stationed and employed in a manner to prevent the possibility of an infraction of regulations, and all other enlisted men of the combatant class could have been put at work, thus increasing the working force fully thirty per cent.

Sentry duty would greatly improve and develop the bluejacket. He would be braced up by being permitted to act as an orderly, and the captain would thus have a splendid chance to influence the bearing, the manner, and the efficiency of his men. *He should be glad of such an opportunity.* That the effect would be elevating and beneficial cannot be denied, and it would improve the bluejacket in the only direction in which he lacks training and experience. An orderly who is familiar with ships, and acquainted with technical terms, would make fewer serious mistakes in carrying certain messages. In the matter of personal cleanliness there is much to be said in praise of the bluejacket. His work in cleaning ship and in scrubbing his clothes breeds the habit of keeping his person clean.

The present plan of mixing the bluejackets and marines causes overcrowding without a gain in working men, and will always deprive the bluejacket of the experience in guard duty. A detail of the latter should always be assigned to this duty when the ship-work does not require "all hands." When "all hands" are needed, *sentries are not needed*—petty officers can look out for discipline *at such times*.

If, instead of withdrawing marines from ships and replacing them by the same number of bluejackets for the reasons given, we are to withdraw a certain number of bluejackets from the battery and replace them by marines, the result will be to reduce the working force still more and thus aggravate the evils from which the service is now suffering. To say that the marine should replace the bluejacket because he may be as good a gunner as the latter is not so logical as to say that the bluejacket, having become as good a rifleman as the marine (as shown by the records of target practice), and being far more useful for general service, should be the one to survive.

Should it be decided in the future to withdraw marines from ships, and thus recognize beyond question that in "loyalty and



discipline there is no difference between the bluejacket and the marine," both corps could be brought to a higher state of efficiency than at present. There should be at least six permanently organized battalions of marines, two on the Pacific coast and four on the Atlantic—one at Boston and Portsmouth, a second at New York, a third at Philadelphia and Washington, and a fourth at Norfolk, Port Royal, and Pensacola. There should be a transport on each coast ready to transfer these battalions to any threatened point. There should be two permanent camping grounds on the coast, one in the vicinity of Gardner's Bay for use in summer, and one in the South for use in winter. The marine battalions could be transferred to these camps annually for special instruction and field manoeuvres, and the ships of the North Atlantic Squadron could also visit these camps occasionally for the purpose of instructing their crews in such matters. The camp equipage could be stored at the most convenient naval station and transported to the camp when needed.

In this manner the marines would be available to co-operate with the Navy without preventing the all-around development of the bluejacket. That the latter would be immensely benefited by such a plan is beyond question. It is peculiarly in harmony with American institutions and character that the bluejacket and petty officer should be freed from the slightest suspicion of untrustworthiness and insubordination. Their equality with soldiers as far as "steadiness and reliability" are concerned should be recognized. No matter what may be the custom in foreign navies, this question should be considered from the standpoint of the greatest good to the greatest number, and with a view to bringing the whole Navy, not a part of it, up to the highest possible standard.

Men of education and intelligence have not hesitated to enlist and serve in the ranks of the Army in time of war. There is no reason why the same class should not be willing to serve in the ranks of the Navy, particularly if the standard of the bluejacket is raised as suggested in this paper. The seaman has a better bed than the soldier, and is surer of three good meals a day. He can certainly keep himself cleaner than the soldier, because there is plenty of water at sea, and the conditions of life may be more agreeable in many ways than in active service on land. It is to be hoped that the high standard of intelligence for which

the naval militia is distinguished may have the effect to ennoble the man-of-war's man's calling in the eyes of the people. The men of the militia seem to be proud of the blue shirt of the sailor, and their influence should be exerted toward securing for the bluejacket of the Navy full recognition for his manliness and respectability.

The following is a recapitulation of the methods advocated in this paper to secure the highest degree of fighting efficiency for our ships:

1. Make the organization as homogeneous as possible, both as regards officers and men.
2. Assign to the duties on board ships the commissioned officers who will plainly be most useful in battle; the same will inevitably be the most useful in time of peace.
3. Make warrant officers as numerous as possible, in order to provide promotion for enlisted men.
4. Give the petty officer the exact status of a non-commissioned officer in the army.
5. Trust the bluejackets, and give them the responsibility of sentry duty, that they may be the better fitted to become petty officers.
6. Bring every possible muscle in the ship to aid in bearing the burden of ship-work.
7. Seek a higher standard than in any other navy in the development of the enlisted men, because of the unusual strain that a state of war would bring upon our service.
8. Give continuous-service men desirable positions in navy-yards as an inducement for good men to remain for a term of years afloat.
9. Encourage officers to study the art of training and developing men, in order that the United States Navy may profit by the established principle that—"*Historically, good men with poor ships are better than poor men with good ships*; over and over again the French Revolution taught this lesson, which our own age with its rage for the last new thing in material improvement has largely dropped out of memory." [Mahan.]

In conclusion, the writer begs leave to state that there is nothing new in this paper except possibly the proposition to instruct officers systematically and carefully in piloting and in all the strategic features of the home coast. In other respects, conversa-



tion with officers of all grades leads to the belief that the recommendations in this paper voice the sentiments of a large majority of the line officers of the Navy—sentiments that are heard every day on board ship. If perfect freedom is permitted in discussing and advocating measures that are deemed *injurious* to the service, *the same freedom must be permitted in condemning them*. In no other way will evils be discovered until they have grown to enormous proportions. The chances of victory largely depend upon the number and kind of men who are assigned to a ship. If it is forbidden to suggest changes in time of peace, it may not be discovered until too late that defeat could have been averted by placing on board ship the officers and men who are logically best fitted to contribute to the fighting efficiency of a man-of-war.

An apology is hardly necessary in presenting this subject before an Institute that is supposed to encourage the discussion of matters affecting the efficiency of the Navy. It may be sufficient to say that this step is taken with all due respect for the feelings of individuals in the service, but with a firm conviction that a frank, fearless, and searching examination of the personnel afloat is necessary at a time when "naval reorganization" is being considered and when the possibility, at least, of future war may be admitted.

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## DISCUSSION.

Captain R. D. EVANS, U. S. N.—Mr. Chairman: I find myself in accord with Lieutenant Fullam on "The Organization, Training, and Discipline of the Navy Personnel," as viewed from the ship, and I am sure all sea officers must thank him for his plain-spoken and timely words.

I believe that the proper organization of the line of the Navy will be found in increasing the numbers in the several grades to meet the demand that will be made upon them as the Navy is increased to the proportions it must, in the near future, assume. At the same time incompetent officers must be weeded out by some process, and I can see nothing better than promotion by selection in the junior grades up to and including commander.

The reasons for seniority promotion above the grade of commander, and the objections to selection, are too obvious and well known to need mentioning.

I, for one, am opposed to all the schemes for reducing the number of officers in the line, because I know from experience that we have not

enough officers afloat to secure the highest efficiency. If officers are too old for the duties they are called on to perform, the efficiency of the service—and that must be the first question considered and the one to which all others should give way—requires that they must be removed from the active list and their places filled by younger men. When we have a fleet of torpedo-catchers and torpedo-boats, and fifteen or twenty gunboats—and this number is now in sight—the question of “command rank while young” will soon be settled, for undoubtedly the authorities will see the advantages of giving all these commands to lieutenants, while the commanders and lieutenant-commanders will absorb many of those now held by captains.

I certainly agree absolutely with Lieutenant Fullam in all he says regarding the necessity for more officers afloat. Unfortunately we cannot discuss the question in all its bearings without being accused of opposing one corps or another of the Navy. In what I may say I wish to disclaim any idea of opposing anybody. I am only trying to give my ideas in a crude way on an abstract but very important question to the country. As an outsider looking at the question of paymasters on board ship, I cannot for the life of me understand why a graduate of Annapolis should not perform the duties of pay officer as well as a graduate of Princeton or Yale; and when I discover that graduates of Annapolis are actually, as executive and navigators, keeping accounts of, and making balance-sheets for, more property than the paymaster, my astonishment is increased.

As regards engineer officers on board ship, I do not think any are required, or, rather, none would be in a very short time if we had warrant machinists and the younger engineer officers taken into the line. All the watch officers of the ship would then belong to one corps, call them what you please, preferably line officers, as their titles seem to be so popular just now. The older engineer officers, who are being disabled at such a furious rate, could then perform their proper duties on shore, where they should, when consolidated with the Construction Corps, make ships and the things that go into them fit each other better than they do now. They could also be employed as instructors at colleges of which we hear so much.

The younger constructors should follow the course now wisely laid out for them by the Secretary of the Navy, and so find out some of the practical discomfords imposed upon sea-going men by their lack of practical knowledge.

I approach the question of marines with great hesitation for many reasons. That I am opposed to marines on board ship is pretty well known, but the reasons for my opposition are either not known or, if known, misrepresented. I find myself not in accord with Lieutenant Fullam as to the importance of landing parties, or more properly, landing drills. The business of officers and sailors is primarily on board ship, and in the new ships, if they attend to their business, they will find they have little time for shore work. Of course, enough of it must be done to enable the men to keep a fairly good military formation if



landed in case of riot, etc. Beyond this it is better to put the time on the turrets, rapid-fire guns and boats.

Coming back once more to the question of marines on board ship, their presence seems to me to be a question for each officer to settle for himself. Do you want marines, and, if so, why? I answer, without hesitation, No; I do not want them because I think sailors are better men for ship work. If we may rate developed intelligence in the enlisted force by dollars and cents—and I think we may fairly do so—then the more marines we have the lower the intelligence of the crew. One can scarcely call this desirable in the vessels we now have to go to sea in. It cannot reasonably be claimed that you can make a landsman any better by dressing him in a buttoned-up coat and putting a red stripe down his trousers. There must be something beyond that. What then is it that makes the greener man more valuable than the more seasoned one on board ship? If you want them to discipline your crew you must admit that they are better disciplined than those who have grown up from apprentice-boys under what I consider the best discipline in the world. As an old training-ship commander I deny absolutely any such proposition. Do you want marines to man your secondary battery. If so, you must admit that they are better for the purpose—better gunners and better shots. Few officers will admit this, I imagine, and those who do will not find the target reports with them. Do you want marines for turret guns' crews? If you do, you want the men of least experience to do the highest class of work on board your ship. If you want marines afloat it must be because you think two separate organizations are better on board ship than one, and, reasoning on this basis, three would be better still, therefore you should have a company of cavalry to further increase your efficiency. The effect upon the entire ship's company is bad, and you are placed in the remarkable position of claiming that one officer who graduates from Annapolis, and develops only one way, and can only do one class of duty on board ship, is better than, or as good as his classmate who is developed in many ways. It may be so, but after a considerable experience I am unwilling to admit it.

If the marines were formed into an expeditionary brigade of say five thousand men, with a brigadier-general to command it, and officered by the valuable corps of officers now in service, and used to garrison the posts near the different navy-yards, I believe it would be the finest body of soldiers in this country, ready at all times to suppress riots and guard Government property. When it became necessary to make a serious demonstration on shore, the proper number of men and officers, properly equipped and outfitted, could be embarked for the purpose, and when the job was done returned to their barracks.

I find myself in accord with Lieutenant Fullam on the subject of "The Bluejacket." The improvement in him, particularly in the petty officer class, during the past ten years, has been most marked, but there still remains much to be desired—better pay, better messing, better clothing, and better care from his officers all around. "Never trust a man in a blue shirt" has caused almost as much brutal harm as that other well-

known saying, "Spare the rod and spoil the child." I do not believe in beating children, and I do believe in trusting a man in a blue shirt. The more you trust the sailor, and the more responsibility you put upon him, especially when he is young, the more valuable he will be, and the more you can trust him as years go by. Let each officer make it his personal affair to see that the comfort of the men is looked after and I am sure the response will be prompt and manly, and let them encourage the notion that seamanship is not a lost art but the most important part of naval education, more important now than ever before.

What we want most of all in our new machines is the seaman, one whose seamanship includes most of what past conditions demanded, and, in addition, the finer seamanship demanded by the new conditions under which we serve. The "habit of the sea," and the art of "sea housekeeping," were qualities which marked their possessor in the old days, and they are of vastly greater importance in these new days of mastless battleships.

Finally, I am sure from my experience in the ships of the new Navy that warrant officers, and plenty of them, are most necessary to efficiency; their number should be increased and the warrants given to apprentices as a reward for professional attainments.

Commander J. B. COGHLAN, U. S. N.—The subject of the essay under discussion—"The Organization, Training, and Discipline of the Navy Personnel as Viewed from the Ship"—has never, in my opinion, been touched upon, or its various needs enumerated and reviewed, in so able a manner as by the present essayist. The statements are lucid and the arguments unanswerable. In many minor points differences of opinion may exist, but as a whole every naval officer should be its champion. Discussion of it might imply a disagreement. What I submit is meant to be wholly, entirely and heartily in its favor. In some respects I wish it had gone further.

"Vested rights" have had many and powerful defenders, "vested duties" have had few or none.

The statutes creating the marine corps certainly create no vested right of service afloat on board our vessels. The same laws provide for their service in forts and garrisons on shore.

If serving on shore, the same pay and rations would be earned. As no manner of hardship to the corps itself would follow their removal from service afloat, there should be no feeling of bitterness engendered by a calm discussion of the question of their retention on board under the new conditions which have lately arisen.

The experience of every one shows that our modern vessels cannot accommodate the people actually required for proper service.

Even with the reduced crews of peace times the conditions have almost reached the limit of human endurance. What will it be in times of war?

The man-of-war's man of to-day is of very different material from the one of a few years ago; is vastly superior in every way. The mode of treatment of even twenty-five years ago is no longer necessary, and in



my opinion the constant surveillance of a distinct corps of police, antagonistic to the mass of the crew, is no longer necessary, in fact, is detrimental to the general efficiency of the vessels. The arguments in vogue to-day for the retention of marines on board ship, if carried to their logical conclusion, would land us in the days of Blake with ships filled with soldiers, instead of in the more glorious days of Nelson, Stuart, Hull and Bainbridge, with vessels full of seamen. As the essayist points out, there is no difference in the raw material of the recruits. The acquired difference is merely one of instruction.

Give equal time to the instruction of blue-jacket recruits as is given to the marine and the same results will obtain. To say that they will not is to decry the naval officer to the advantage of his brother of the marine corps. They are all men of intelligence, and the same ends will be reached by use of the same means. Since this must necessarily be the case, what are the advantages of retaining the marines as a distinct corps on board our vessels? Certainly the reports of target practice merely show that advantage lies only with the men who receive the most practice in the work. With their special arm, at which they have a vast amount of practice, the marines are slightly superior. With great guns, at which the average sailor man has the excess of practice, he is as markedly superior as is the marine with his special arm. As the original material the recruits were equal; it follows that were both classes equally drilled and instructed with each class of arms the difference would be nil.

I thoroughly believe that the sailor man can be taught anything. His life makes him a man of resources. The exigencies of sea service place him where his brain must work for his own salvation, and where it so works it enlarges; it never goes back, and thereafter he is all the more able to grasp other situations and surmount other difficulties. Create in our people the *esprit du corps* of the marines, and the guard duty of our vessels would, I am sure, be equally well performed by the blue-jackets. And this is the main, in fact the prime duty of the marine corps at the present time on board our vessels. The substitution of an equal number of blue-jackets for the marine guard would not in any way destroy the efficiency of the gunnery of our vessels, but the efficiency of the working force would be greatly increased. When thought of in this connection it seems marvellous that any naval officer should oppose it.

The assignment of thoroughly instructed "all round" useful officers, such as lieutenants and ensigns, to perform the duties of the present pay corps, would be of the greatest utility. "All round" service is now required almost daily. To see that the duties of pay or disbursing officers would be equally well performed by line officers we have but to glance at the "Report on the Modern Light-house Service" of Mr. A. B. Johnson, page 107.

Officers of the military branch would be better able to judge military stores, and they would be on the same footing regarding other stores as the newly-appointed paymasters, who, taken from civil pursuits, know nothing of any stores at all. Instruction and observation afterward supply this knowledge, which would also be the result in case of a lieutenant.

The "vested rights" of paymasters now in the service might well be protected in the manner pointed out by the essayist. But the proposition is good to the last degree and I heartily endorse it.

The essayist's remarks on the organization of the engineer corps are just and should be heeded. I have been thoroughly convinced for years that that corps as a corps of commissioned officers is entirely too large for the needs of the service. They are educated far beyond the requirements of engine driving, their principal duty on board ship, and rightly scorn it. That duty is performed the world over by men of the same grade and education as our machinists. And that such men fulfil all the duties and requirements in the fullest sense of the terms can be seen any moment by a glance at the records of the merchant marine of the world. In my opinion an engineer officer should be attached to each vessel (to some larger ones an assistant also), whose duty should be that of supervising and superintending the steam machinery, while the machinists stand the watches. This would give the commanding officer a reliable assistant in the engine department, and would give the engineer practical experience with machinery which he may have helped to design.

In my opinion, no such step in advance has of late years been made as the order of the Navy Department sending constructors to sea to study the working of vessels under the very conditions for which they are built. Good results must accrue from it.

The move lately made in Congress to increase the engineer corps and assign naval engineers as professors to colleges "to propagate a knowledge of steam engineering" may sound very well and may be catching, but it is bad for the Navy.

Why should the money appropriated for the Navy be squandered teaching schools outside?

Instead of being looked upon and sought after by the States as a benefit, it should be regarded as an insult, as another step toward centralization on the part of the General Government. The thousands upon thousands of merchant vessels in existence since the introduction of steam have been well run and well handled without schooling from the General Government—in fact, have led the way in steam engineering. No collegiate or scientific education is required or found necessary for running those engines, and none is required for the same work in the Navy.

Such a law would simply increase the expense of the Navy without the slightest corresponding advantage. With an engineer corps properly proportioned to the needs of our service, the Naval Academy could easily supply more than are required and of the proper scientific requirements for designers.

No "vested rights" need be interfered with in this case either, as the Bureau of Steam Engineering and the various navy-yards have many important and congenial positions to be fulfilled by such scientific men.

The day of the "all round" useful officer has indeed come, and the Navy should be proud of the perfect way in which the naval officer has



met it. He has grasped the subject of armor, guns, ammunition, mounts, projectiles, turrets, electrical machinery, turret gear, hoists, in fact everything pertaining to his profession, and in the space of a few years has placed our Navy ahead of the world in such matters. Since their installation on board, these implements have been well cared for and well handled by the naval officer, and yet we find people trying to have the control of them taken from those officers who originated, fought for and (in spite of all opposition) obtained them; from the officers who have since then cared for and used them with signal success; and turned over to a corps which is, by the reports of its chief, already overburdened with work to such an extent that it is absolutely necessary to increase its number; whose members, according to the daily reports of the newspapers both professional and lay, are breaking down under the frightful strain of the care of the multitudinous machinery already in their own department. Such reorganization would be a step backward. The naval officers in charge have demonstrated their ability to install and care for these things at no increase of cost and no increase of men in their corps. The corps to which they are sought to be transferred is asking for an increase to perform the duties already imposed, and with other duties added a still further increase would necessarily be required.

Since the naval officers now in charge care for this machinery without extra expense either in increase of their numbers or by breaking down and going on the retired list, let them keep it.

I was heartily glad the essayist has so just a view of the utility and desirability of warrant officers. His remarks on this subject deserve the most careful attention. I would like to see the number of boatswains, gunners and carpenters trebled. Not only are they of the utmost importance afloat, but the navy-yards, magazines and stations need them.

The introduction of warranted machinists would be exceedingly advantageous. The whole history or record of the warrant officers in the service shows them to be a body of intelligent, worthy, able men of perfect loyalty and discipline. They respect themselves and they have been respected by the service both low and high. Something must be done to retain our highly trained and intelligent young men in the service, and how can this be better done than by promoting them to such important positions?

Glance for a moment at the various positions at our navy-yards which could be filled by warrant machinists, for example. Our yards are full of secondary machinery, such as hoisters, derricks and fire-engines. These positions are filled by expensive men, employed by the day, with no earthly interest in anything but getting their pay and doing as little as possible in return.

In case of war and sudden need of men, would these *per diem* people jump to help the service? No; judging by past experience they would jump to get an increase of pay on account of war, and the Naval Establishment would be in the position of having fostered them in peace to gain no benefit from them in time of war. How different would be the

case were men actually in the service assigned to these places in time of peace.

Such positions as riggers of the different departments, laborers in store-houses and gangs, ordnance men and cartridge-makers, could and should be filled by men of the Navy whose services could be commanded afloat in time of necessity. These would constitute a splendid reserve, up to the latest improvements and ready at a moment's notice.

I heartily approve the motto "Let the Navy take Care of its Own." Employment in this way at the naval establishments of efficient navy men entitled to reward would be but a step in advance over the present mode of employment of ordinary outsiders at the navy-yards. And the expense of the whole establishment would be decreased. Steady employment never demands as high wages as does sporadic. The item of "Pay of the Navy" would be slightly increased, but the pay of the civil list would be more than correspondingly decreased.

Regarding the status, training and reward of the petty officers and men, the essay shows that its author has studied the question thoroughly, has looked at it from the proper standpoint, and has pointed out a general way for a permanent improvement.

In a small way his assertions are proven to be true by the status of the "gig's crew" on board of any man-of-war. That crew is trusted far beyond any other, and consequently is always the most reliable one on board. Compare the conduct and reliability of the mail messengers when blue-jackets are entrusted with this duty, with that of marines. Is there any difference? None. There are unreliable men under both uniforms, but the ratios do not differ.

In my opinion the essayist has handled his subject in a most masterly manner and deserving the thanks of all the well-wishers of the naval service.

I would detain you a moment longer to speak in praise of his idea of teaching the officers piloting and conning. The course pointed out would be of the very greatest advantage to the country.

In this respect my service in southeast Alaska and in the 8th Light-house district has been the best I ever had. I have been enabled to learn those parts of the country to a degree which I could not have done in fifteen years of ordinary man-of-war cruising.

Unfortunately, the subject of piloting has never received proper attention.

When going in or coming out of any harbor all the naval officers should be called upon to study the locality and the charts; should be on deck to see and understand the movements and changes of course, to note the various ranges, lights, beacons and other marks. In fact, the passing in or out of a harbor should be an object-lesson for each naval officer on board.

A double set of harbor charts should be supplied, so that the study could be made by the body of officers without in any way inconveniencing the commanding officer in a tight place. The essayist's idea is so good that I for one shall make use of it hereafter.



The 4th, 5th, 6th, 7th and 9th propositions of the Recapitulation should be framed and displayed in every cabin, wardroom, steerage and state-room of the service, as a constant reminder of what is needed and as pointing out to the officers the road to brilliant success.

The other propositions being beyond the immediate power of the officers, should be thoroughly studied, that intelligent arguments in their favor might be submitted should the proper authorities ever call for them.

Lieut.-Comdr. W. J. BARNETTE, U. S. N.—While considering that portion of Mr. Fullam's most excellent paper relating to the subject of marines on board ship, I would like to say, as a result of my experience, that I have never found them as valuable as the space required for them. In a ship of the Maine class, where there is room and to spare, the marines can be endured, though I am satisfied that much better results would be obtained with a homogeneous personnel; but in vessels of the Raleigh and Cincinnati and smaller classes there can be no question that the ships would be much more efficient as fighting machines with blue-jackets substituted for the marines.

In the many exercises to determine the rapidity with which ammunition can be supplied to the battery in a given time it has been shown that with an addition of two (2) men to each gun of the main battery, and fifteen (15) to the powder division, making twenty-nine (29) in all, the supply of ammunition would be equal to any demand likely to be made upon it, and not otherwise.

These 29 additional men represent the strength of the marine guard in this class of ships, and the question naturally arises, why not put the marines to these duties? Because they object to being distributed in this manner, and there would then be no further reason for the existence of a marine officer on board ship; and where would be the sense in having a differently uniformed and trained body of men to do duties identical with those of the main body of the ship's company? And then again consider the immense help it would be to the working force of the ship to have their number increased one-fourth when it comes to scrubbing, cleaning and coaling, which constitute three-fourths of the whole work of the ship.

I venture to say that there is not to-day a ship in commission with full complement which could call away a cutter or whaleboat and be sure that a full crew would respond, owing to the hospital, sick and excused lists. Without marines there could not be this unfortunate state of affairs.

There has been no doubt in my mind for years that our ships would be much more efficient with the marines replaced by an equal number of blue-jackets, for I have never found the duties performed by the marines afloat at all proportionate to the space required for them; and I fail to understand the objections of the marines to being assigned exclusively to shore duty, for on shore they are much better off in every respect and can be exceedingly useful. The time is coming, and very shortly,

when, in addition to their present very important shore duties, they will be required to guard outlying coaling stations.

Ensign PHILIP ANDREWS, U. S. N.—I agree entirely with Lieut. Fullam in all that he says in his paper regarding the main features of any reorganization of the Navy, though not always attaching the same relative importance to his reasons for the different steps necessary for an efficient organization.

The number of engineer officers at present is not enough to have all engine-room watches at sea taken by *commissioned* engineers on all ships and give a moderate allowance of shore duty; but it must be remembered that a modern ship is more often in port, when engineers stand day's duty, and then there are twenty-five engineer cadets at sea who are given a watch as they show themselves proficient. The number of engineers is too great if the watches were stood by warrant machinists. If this latter system could be gradually introduced so as to do least harm to officers' interests by the change, and the engineer corps was limited to the design, construction, and supervision on board ship of marine engines, I believe that engineer officers—their education and inclination being entirely in that direction now—would be as well satisfied with their duty as men could be, and I think the efficiency of that branch and of the service would be improved.

The warrant machinist system is opposed by those engineers who are heard on the subject of a reorganization of the engineer corps, but it would perhaps be interesting if those who remain habitually in silent acquiescence would give their free and honest opinion as to its merits.

Certainly the experience of other navies would seem to show that it is the best plan.

I believe the marines should be withdrawn from all ships. I have been often impressed with the difference in physical development between the blue-jacket and marine, which difference is symbolic of the usefulness of each. On large, roomy ships, of which we now have few, the presence of marines is not felt to be such a distinct disadvantage; but in the smaller ones, or in ships of great coal capacity and paint area (like the *Columbia* and *Minneapolis*), the displacement of marines by all-around working men is generally felt to be a necessity.

In the next three years about thirteen per cent of the pay corps retires.

In the next ten years about forty-seven per cent of the pay corps retires.

Of those who have entered the pay corps in the past two or three years it is said that they will only have to have a total sea service of about six years and a total service of about ten years before their rank will entitle them to remain on shore duty.

It seems to me that advantage should be taken of these wholesale retirements to gradually withdraw paymasters from all ships but flag-ships, which might have a paymaster of the fleet, the remainder to be naval storekeepers and purchasing paymasters. No more paymasters need then be appointed unless it is found necessary to recruit the small



force needed for fleet paymasters and naval storekeepers. The work of accounts on board ship may then be given and easily performed by the officer of the powder division or other subordinate officer.

It is reported that the same system has been recommended by Secretary Lamont as a business measure for the reduction of the Quartermaster and Pay Departments of the Army, and it can be accomplished without damage to the vested rights of individuals.

While a stern regard for an efficient naval organization would trample ruthlessly on the so-called vested rights of individuals, it seems apparent, from the experience of the past half-dozen years, that Congress is not now prepared to take such immediate steps, and that the final perfected system, if ever arrived at, must be reached by more or less gradual stages.

From a casual examination of the retirement list of all branches of the service, it seems plain to me that if a start is not soon made Congress will, in from six to ten years hence, deal the Navy several crushing blows.

It is for the Navy to say whether it will wait to be hit on the head.

Ensign T. P. MAGRUDER, U. S. N.—Though disclaiming new ideas concerning the organization of the *personnel*, the essayist deserves credit and praise for giving the proper point of view from which to consider the subject. The ship is the common ground upon which all the conflicting views and opinions may be made, discussed and harmonized. It is not difficult to form an intelligent opinion upon a question as to its relation to the efficiency of the unit of naval power; yet the same question considered from another point of view may cause a decision correlative to efficiency.

The essayist's views concerning the disposition of the staff corps will undoubtedly call forth strong antagonism from those corps, since the argument is made that two corps should be withdrawn from ships and that the numbers of another corps afloat should be reduced. Consequently, those agreeing with the essayist—I do unequivocally—should in duty bound express their views. And, as is pointed out, particularly is this the duty of the line officer—in command, or being educated for the ultimate purpose of command—who being alone responsible for the efficiency of the ship as a whole, his opinions as to the methods of obtaining that result must prevail.

Were the pay corps reduced in numbers, say to twenty, lowest grade to rank with lieutenant-commander, their duties would be the important ones at the navy-yards and in charge of navy pay offices. Not being bred to the sea as a profession, it would seem that such a change could not be otherwise than agreeable to the pay corps.

It has been well said that naval engineers have a just cause for discontent, arising from the fact that many, under present conditions, must habitually perform mechanical duties and subordinate work in which their high education, excellent training and brilliant attainments—and the naval engineer has these—have but little scope. Warrant engineers would

relieve the officers of much of their routine work, which can be done equally well by skilled machinists, thus giving the officers time for study and research of the many intricate problems that confront their profession. The duties of the naval engineer would then naturally be the legitimate ones of an officer—those of directing and superintending the care and running of ship's machinery.

Withdrawing the marine officers from ships is not such a radical change as may at first appear. Of a corps of 76, there are now afloat only 16 officers in charge of guards, and six second lieutenants who, I take it, are on flagships for instruction. Thus it appears that the principal duties of the marine corps are on shore. The fact that a large number of commanding officers of the North Atlantic Squadron are known to favor strongly the replacing of marines by blue-jackets must be conclusive proof that the change will increase efficiency. That there is no longer a need for a specially trained corps of marines for service afloat we have the testimony of many officers who have sailed on ships that had no marines aboard.

There can be no dissentient opinions to the pleas of the essayist for the betterment of the condition and position of the blue-jacket and petty officer. Forcibly bringing to the notice of young officers the importance of caring for the welfare and comfort of the men will not be the least value of the essay. Personally, I am grateful to the essayist, and I take pleasure in the acknowledgment.

Commander F. E. CHADWICK, U. S. N.—Lieutenant Fullam's serious and thoughtful paper deserves, and I hope will receive, a full and general discussion; it touches the essentials of the service, which we all recognize are now somewhat in a state of flux; with the new conditions of material we need, to some extent at least, new conditions amongst the men who use it.

First, I would compliment Lieutenant Fullam upon the self-contained character of his article; I think no one can take exception to its tone. This, in view of the much improper and wholly uncalled for expressions of which we see so much on the part of persons discussing such subjects should be noted and praised.

To take the subjects seriatim:

#### *1.—Promotion of Officers.*

I can see nothing for it in the future but a scheme of selection; there is no other logical system; and this selection I would carry from the bottom (where we have already had it for many years) upwards. The only question to my mind is how far, *i. e.* through how many grades this should be carried. Logically, through all. But in practice I believe the English are right; they stop with captain (their true command grade, their grade of commander being really assimilated to ours of lieutenant-commander). The French select also from captain to flag rank; but I have heard no French officer speak of this who did not



think the English system preferable. They have always stated that the jealousies among their captains arising from the strife for flag rank were a serious detriment to the well-being of the service. Such jealousies can have no such extended effect in lower grades, and it would seem well to make the grade of lieutenant-commander the last from which officers should be selected; thereafter certain age limits should apply, and facilities be given to older men to remove from the active sea-going list.

Much feeling has been aroused on this and the associated question of reorganization of the line of the Navy, but we must at least face the fact that something has to be done, a fact which was made clear to the whole service so long since as 1891. Many persons, particularly in Congress, seem to have regarded this movement as a self-seeking one on the part of a large portion of the line officers, but the fact should be remembered that the movement had its inception in the highest motives, was begun by the Secretary of the Navy and supported by the senior officers of the service, and that certain antagonisms have been developed only by force of circumstances beyond any control or forecast.

The last paragraph of Lieutenant Fullam on this subject is very admirable, and is, I think, not to be gainsaid.

#### *2.—Officers Afloat.*

We need more, not fewer. In fact, there must be a large increase of the line if anything like our present system is to be adhered to. We shall soon have afloat seventy-five per cent of all the officers on the Navy list below number 25 on the list of lieutenant-commanders. We shall be quite unable to keep up our present system of shore duty. This I have come to think will be a matter of strong regret. We differ essentially from the English in the fact that their officers are kept much more continually at sea; the shore administration is almost wholly civil. Each system has its good points, but I have come to believe that the defects in ours are much more than offset by the fact that our officers become much more intimately acquainted with all the details of the material they are called on to handle than those of any other service. I believe there is no officer, take him full and bye, who knows his ship and what she contains as the American. He has inspected her steel; he has designed and built her guns and mountings; has superintended the manufacture of her torpedoes; has inspected and installed her electrical plant. This can be said of the officers of no other service, at least in any like degree, and the result is good. An intimate knowledge of tools handled is one of the best bases for success in their use.

In regard to the utilization of line officers as pay officers, such a scheme has many advantages, but there is one point which requires much consideration; this is the status of such officer in the hierarchy of command. If he were confined to the duties of pay officer during the three years' cruise he would certainly not be the officer to succeed say the captain and executive if they were killed in action. He would, if in the line of command, certainly have to take such part in the ship's man-

agement as would enable him to keep his hand in, so to speak, and not find himself adrift in such a momentous emergency. It is not impossible, of course, to so arrange his duties at sea, or even to some degree in port.

There are questions as to bonds which may arise, but I do not see the necessity for the exaction of a bond. Already any officer may be called upon in certain emergencies so to serve without bond. Nor, to look at it in a common-sense way, will the ordinary bond exact anything more in the way of honesty and uprightness than the penalty of loss of commission if there be malfeasance.

Regarding engineers, it is in my opinion quite time that the baths expended on this subject should end. No one will pretend to deny that the first and supreme quality for duty in the engine-room is to be a good mechanic. The duty at sea is a purely mechanical one, and no effort of any man can lift it on to any other plane. It has nothing to do with the conduct of the ship; it ends with keeping the machinery in proper working condition. It should be remembered that it is not the value of a machine which is of importance, but the use to which it is put, and with this use the engineer has nothing and can have nothing to do.

If we continue the education of engineer officers at the Naval Academy, there should be but one such officer on board ship. All the others should be of the present machinist class, a portion of whom should be warrant officers assimilated in rank, etc., with the warrant officers now existing. The idea that we need the whole educational facilities of the country made operative in the direction of turning out engineers for the Navy becomes simply ridiculous when it is known that the yearly waste needed to be made good is about six. These educational establishments would, besides, not furnish the kind we want. We could, in an emergency, get any number desirable and of much higher quality from the merchant service. The engine, as has been well said, does not know whether it is in a man-of-war or a mail steamer, and will run equally well in either under the same superintendence.

I am inclined to think that the utility of marines on board ship is a thing of the past. In any case they should never be there unless the ship be large enough for an officer's guard. If it be a question of marines or blue-jackets, by all means give us the latter—the marines as an *addendum* but not as displacers of the sailor man.

The experience of England has been too pronounced as to the value of the blue-jacket ashore for our officers to undervalue it; in fact, our ships should be overmanned in order to afford as large a landing force as possible.

The last paragraph of "Officers Afloat" is worthy of every one's attention; it embodies truths of utmost importance.

#### *Training of Officers.*

I agree with what is said as to the Naval Academy, except that I would make the course one of four years and raise the examination



for admission, taking in more subjects. If every 180,000 of our population cannot furnish once in four years a really well qualified boy between 15 and 17 to enter the Academy, the country is in a poor way from an educational standpoint.

I cannot agree altogether as to the "School of Piloting." I think our cruising ships should form this school. I think the abrogation of the order which required officers to do their own piloting a great mistake. We had under that order an excellent school now thrown away. The junior officers of ships in the North Atlantic Squadron could be as readily trained in pilotage aboard their own ships as in a specialized one, if we did the exercising we should do. Finally, we cannot afford so many different schools of application with our very small number of officers. Let us utilize present conditions as much as possible instead of adding to our complexities.

#### *Warrant Officers.*

The gunners and boatswains should be largely increased in number; they would form a far better class from which to add to the number of deck officers in case of war than any body of men taken from without the service, whatever their provenance.

I do not think there should be any compulsory promotion yearly of a certain number from the warrant officers or enlisted men to commissions. It must be remembered that any man who enters the Navy has also a chance to enter the Naval Academy. It is a thoroughly democratic institution, established to form officers in the best manner possible; it is open to every one in a district if a competition be held; if the Representative prefers to make the selection himself he is responsible for any abuse in making it or for any violation of our democratic principles. If the enlisted man has passed over his chance of seeking an appointment to the Academy he has no right to complain that he has been debarred from a commission. All the same, I think there should be a board from time to time to report upon warrant officers or enlisted men recommended by commanding officers as deserving to be considered for commissions. But there is no more inherent right to such promotion on the part of the enlisted man than there is on the part of the commissioned officer to be promoted to a next higher grade unless he be a specially qualified man. The rule is equally applicable to the enlisted man and to the officer; in the one case, however, it has been recognized and in the other not. In no case, however, should there be the promotion of a half-deserving man. His promise as an officer should be as great as that of the Naval Academy graduate, else there is no reason for promoting him; it is the good of the service which is involved, not the question of the advancement of a man or any set of men for sentimental reasons.

No railway promotes a brakeman to be an officer of the road for the mere sake of cheering the others; he must have the qualities and attainments needed in the new position. This seems to me common sense

which should apply to the Navy as well, unless we are prepared to accept socialism pure and simple.

It would be much more to the point were we to improve the enlisted man's position in general; give him more space, more comfort, treatment always wise and humane, and give to petty officers that consideration which their position properly demands. These principles applied to the whole body of ten or eleven thousand men would count for much more than the illusory sop of a yearly promotion of one in five thousand. All the same, give this, too, if the man is of a type to command it, for the "Good of the Service."

Commander C. H. DAVIS, U. S. N.—I have read Lieutenant Fullam's essay with great interest, and there can be no doubt that taking the ship as the test, Mr. Fullam's ideas are sound and in the right direction. Those of us who have been in the service long enough can follow by our own recollection the successive steps by which the "vested rights" of the several branches or "corps," which are not corps, have grown. There is but one corps in the Navy and that is the Navy itself; or if there are several corps, then each squadron or ship acting singly is a corps. That is a true military definition. No branch of the service can be a corps unless it acts together as a body, which the "corps" never do except in opposing legislation looking to the military efficiency of the Navy as a "corps." We have accepted this word, which has not yet been forced upon us by legislation, as the misnomers "staff" and "line" for the civil and military branches of the service have been. I say misnomers, because the staff seldom is a staff and the line never is a line. All these terms are simply indications of the general inefficiency and decadence into which the Navy drifted, with deliberate intent, in the twenty years following the close of the civil war—years of utter inanition and decay, in which military efficiency was deliberately lost sight of and ignored; so the civil branch, or "staff corps," in these years grew prosperous by the very argument that they formed no part of the military body; that they represented civil rights in a military body as opposed to a military oligarchy which sought to rule very much as a fungus will grow to great size on a rotten tree. And they continue to appeal to that argument to this day. It would be hard to conceive of a greater departure from military efficiency in a military body. But the Navy only lived through those years because nobody took enough interest in it to propose to abolish it outright. And there is another tremendous abuse still very dear to us all which these years produced and made legitimate so that it is recognized to-day; that is the abuse of "shore duty." "Shore duty" for sailors—the very idea is anomalous and absurd. Whenever a naval officer accepts "shore duty," or an appointment to shore duty, it should be with a distinct understanding that by so doing he drops out of the line of promotion and accepts retirement. You could always find plenty of retired officers for shore duty, and plenty of active officers who would be willing to retire for the sake of shore duty. Repeal the law prohibiting the employment of retired officers, and pass



As regards the marines, every additional day's experience strengthens my conviction that they detract from rather than add to the discipline of ship life, and that they are room-takers and "idlers" in the sense of not being available for general duty. I hope the marine corps will never be abolished; I hope more to see it dispensed with as a part of our sea-going force. In intelligence I believe the bluejacket recruits will average superior, and I fail to see how a particular livery is to inspire virtues that another will not. To say that bluejackets cannot be made trustworthy is to charge, or admit, incompetence. I have no reason to admit it, nor will I. Sending ships to sea without marines is no experiment. Attached to the N. A. station is a ship in full commission without a marine on board; the discipline is excellent and I have yet to hear complaints from her officers that the bluejackets are untrustworthy. This cry is a bugaboo; men are very largely what circumstances and training make them, and the blue shirt covers just as great possibilities as the shell jacket. Let us, then, have our ships manned by as homogeneous a body of men as possible. There is no room for a corps of men on board ship who are there avowedly to do only a part of the duties of ship life, and whose duties, such as they are, can be quite as well done by bluejackets.

The warrant officers are a particularly deserving class, and I should be glad to see their numbers greatly increased. The Navy still has a place for boatswains and carpenters, and the necessity for gunners was never as great as it is to-day. Under Navy conditions I do not believe promotion to a commission from the ranks is practicable; hence a warrant is the aim of an ambitious enlisted man. But the small number of warrants now conferred annually is rather an infinitesimal objective for 10,000 men. Did numbers allow, warrant officers would be more useful on small ships than the same number of junior officers; on large ships they can scarcely be dispensed with.

I have long believed in a small corps of commissioned and a large corps of warranted engineer officers. It is an absurdity to give commissioned engineers the technical education they receive merely to run engines and do the drudgery demanded of engineer watch officers at present. To put commissioned engineers on board ships in a superintending and advisory capacity only would greatly enhance their responsibility, their comfort and the dignity of their profession. As for machinists, they are a superior class of enlisted men under their present status. But it is hard to keep the best of them, as every officer knows, for they can do better for themselves in civil life, both in pay and in comfort. Their duties on board ship are arduous and require unremitting attention, and they are subject to sudden calls by night as well as by day; and as petty officers of the watch they must exercise control over considerable bodies of men. Yet they mess and berth under the same general conditions as the rest of the crew. I have known of a machinist going ashore to hire a room after working all night in an emergency because there was no place on board ship where he could get sleep in the daytime. With warrant rank as an inducement, I believe it would be possible to get and hold a superior class of men who would do all the duties performed by machinists now and, in

addition, a very large part of the work that our system entails upon the engineer watch officers. It seems strange that the bitterest opponents of this scheme are the commissioned engineers.

It is a very great pity that it has seemed necessary to send apprentices, 3d class, to sea-going ships. They are too young and undeveloped to give efficient service, as a rule, and the weary months they must spend before an advancement in rating, during which they must accumulate two months' pay on the books, and after that clothe themselves, do their share in the mess, and find pocket money, all on nine dollars a month, are a period of hardship to the boys and annoyance to their division officers. An apprentice, 3d class, is not fit in any sense to take up his life as one of a regular ship's company.

In his commendation of the War College Mr. Fullam will have many and an increasing number of backers. Our material got to such a very low ebb for so many years that the energies of the Navy were almost entirely devoted to its improvement, while the question of how to use what we had and might have was rather lost sight of. The War College has done splendid work in directing attention to the broader questions of our profession, and its utility and necessity in that line cannot be too strongly insisted upon by its friends.

Lieutenant F. J. HAESELER, U. S. N.—The views expressed in Lieut. Fullam's paper are so thoroughly in accord with those of the line officers of the service, in general, that it seems unnecessary to attempt to criticise the paper under discussion. At the same time, as Mr. Fullam speaks of some officer having made the statement that the bluejackets cannot be relied upon for guard and police duty, I desire to testify to the contrary, as has been illustrated on board the *Amphitrite*, to which I am now attached. We have on this ship the most contented crew I have ever seen. From this statement it must not be argued that therefore we have better men than other ships, thereby making the police duty easier. For on looking over the enlistment papers we find amongst the men who have the best records on board this ship that their past conduct has been anything but good. We have but one post—that of orderly on the cabin door, and he is on post only from "all hands" to "pipe down." When coaling ship, or when alongside the dock, there is a sentry on the forward gangway, and the quartermaster looks out aft. These sentries are taken from the seamen of the ship, and are put on duty for a week at a time, in three watches. During the year we have been in commission we have had but three or four cases of the men getting past the sentry, and when one considers the fact that the men can step off the side of the *Amphitrite*, anywhere in her length, into a boat or upon the dock, this seems the more remarkable. We have had frequent cases of men being held up by the sentry and prevented from leaving, and in one case where a man did get by the sentry, three of them had started up the dock on a run trying to pass him; *he got two of them* and the third got by. Immediately after this episode another ship of the same squadron, having marines as sentries, went alongside the same wharf, and her men



were constantly running by the sentries without, in any case, being stopped. The orderlies on the cabin door form the gig's crew, and are not excused from any routine work in the morning watch, and are regular members of the different guns' crews. When the captain leaves the ship his orderlies man his boat and the bugler goes on post. The mail orderly is an apprentice, and it is interesting to note that all the mail orderlies we have had have been thoroughly reliable, never losing a letter or getting their accounts mixed in any manner. They have been accommodating, reliable and efficient, and have never had the slightest trace of liquor about them on returning from the shore on duty. This will seem all the more significant when it is known that in one case the mail orderly in question is a fairly hard drinker when off duty. The ship's corporal usually comes back to the ship from liberty over time and with every evidence of having been on a "spree," and yet this same man has brought men to the mast for attempting to smuggle liquor, and carries out his duties thoroughly and without fear or favor. Men are not searched at the gangway, but in case any member of a boat's crew is caught attempting to smuggle liquor, which has occurred once or twice, the *coxswain* of the boat is very heavily punished, which discourages the practice and reduces the smuggling to a minimum.

If marines were to be stationed on board this ship according to her rate, or according to the number of posts that would *then* be found necessary, we would have to withdraw at least twenty-five men from the seaman class. At sea, going down to Port Royal last summer, the men played out so fast in the fire-room that the deck force had to be drawn on, and finally there remained only enough men on deck to man the life-boat in each watch. This was allowing one man at the life buoy, one at the wheel, one on the look-out, two at the boat's fall to lower the boat, and one overboard. Had we marines instead of twenty-five of our blue-jackets we would not have had a life-boat's crew left. When this ship is coaling the only men who do not work are one orderly, who stands orderly and messenger watch all day, the quartermasters, the sentry and his relief, the dynamo attendants, and chief petty officers. The chief boatswain's mate is in general charge, and all the other petty officers, including the armorer, gunners' mates, jack of the dust, coxswains, boatswains' mates, messengers, etc., are all at work with shovel or wheelbarrow, and the consequence is that the coal comes in lively and there is *no discontent* due to seeing a lot of idlers lying around. *A marine guard on board this ship would increase the time of coaling fully 33 1/3 per cent.* Another point often raised against the bluejacket is that he will not assist to arrest a messmate. This may be so if the man he is to assist is a marine. I happened to witness a little incident on the quarter-deck of this ship when a big burly seaman, over six feet tall and weighing over two hundred and fifty pounds, was brought aft fighting drunk, having just returned from liberty. He assaulted the master-at-arms at the mast, and the officer of the deck directed the messenger and orderly, standing by, to assist in the arrest. They both jumped in without the slightest hesitation and pulled the big fellow down, and one of them getting hold

of the end of a boat's fall lying handy, got a turn around his legs and through an eye-bolt in the deck in a manner that I doubt if any marine could ever have attempted. The argument advanced against this evidence of what a bluejacket will do when put on police duty is that if the marines are required to perform the same duties as the sailor, and are given similar suitable clothing, and pay corresponding to the harder and more difficult work, that they will do equally as well as the bluejacket. If this is all so, where would be the difference between the two? Why have a division of men on board ship exactly the same as the bluejacket, with all the duties, dress and pay of the bluejacket, and the only difference being that such a division is commanded by an officer who is available *only* for the duty that an army officer is capable of performing? It would require a separate store-room, separate accounts and returns, separate liberty lists, and a hundred other special reports and channels of red tape to help confuse the already too intricate system now in use. Is the marine officer so much in advance of his brother officer of the line in intelligence, in control of men, and in knowledge of the modern intricate guns and mounts, their care, handling and repair, that he should take the place of one of the line officers, who is useful not only in the battery, but in the handling of the ship, and, in case of an emergency, in the handling of the engines? The marine officer can have but one duty—that of drilling his guard either at infantry or at great guns. The line officer is liable to be called upon for *any* duty performed by any one of the officers of the greatest battle-ship that floats, with the exception of the duties of the surgeon, and even in those he has rudimentary instruction. The same relative difference exists between the bluejacket and the marine. It would be but a fair test to have one of our battle-ships manned entirely by bluejackets, and should such an experiment prove a success, as it certainly has on this ship, I think it would convince the very few who are so conservative that they cannot see that while the marine *was* necessary for the police and sharpshooter work of a man-of-war fifteen years ago, the apprentice and better enlistment systems and rapid-fire guns have rendered his presence not only unnecessary, but prejudicial to the development of the petty officer and bluejacket, the men on whom, after all, we must largely rely in time of battle, no matter if the marine is retained as a factor in the ship's complement or not.

I do not agree with Mr. Fullam that if in time of war the number of commissioned officers becomes increased from the warrant officers, that at the end of the trouble those so commissioned would resume their original positions. It would not be illegal, but a great injustice to put men in positions of trust and responsibility in time of war and then reduce them in rank after faithful service. It would look as though the duties of the line officer in time of peace could not be performed by the men who could fulfill them satisfactorily in time of war—a manifestly impossible condition.

Commander C. F. GOODRICH, U. S. N.—There can be no doubt touching the soundness of the essayist's contention that the efficiency of the



ship should be the criterion of naval organization. By it, all schemes of reform should be judged. It seems odd that so axiomatic a proposition is not universally accepted, but we must not forget that our troubles are largely due to ourselves; that we have encouraged and promoted the notion that duty afloat is but a minor incident in our lives; that the real prizes of the Navy are not to be found on the water; and that his sea service has been but too often regarded as a measure of the individual's inability to secure comfortable and continuing employment on land. A better spirit has begun to manifest itself, but even yet the most successful naval careers of the present day are not characterized by creditable or brilliant work afloat so much as by the occupation of desirable billets on shore. It should be our aim to gauge an officer's merits more by the discharge of his naval duties and less by what he does when not on board ship. The first breath of war will dissipate this mental fog. The officers who have shown coolness, courage, discretion and ability on the deck of a ship and in the handling of men and fleets will then receive their just recognition, and in them will center our hopes for relief from impending danger. Until that day arrives the existing false idols will continue to be worshipped, although, through concerted effort, we may minimize the cult and its attendant detriment to the *esprit de corps*.

As to the form which naval reorganization will assume, if any, I have but one word of advice to offer. Lay your schemes before the Secretary of the Navy. When he submits a plan for congressional action, accept his decision as final and lend your aid in getting his measure passed, no matter what be your individual views or the sacrifice it may exact of you. In any event, abstain from opposition. In our present condition anything is better than nothing. Without the Secretary's recommendation no bill can become law. It is not impossible, too, that, having all the suggestions before him, he may reach a conclusion wiser, in the main, than any one particular project.

It would be difficult for me to take issue with the general trend of this paper, for I am on record as favoring its purpose and its essential features. In my opinion, there should be no naval officers except those who go to sea, and every effort should be made to place as many as practicable of the officers on board ship among the combatants. The medical and engineer corps are specialists whose attention, during action, will be abundantly occupied in keeping the machinery of ships and men in operation. They are as vital to the fighting efficiency of the vessel as the line officers—no less and no more. As we grow older in the service, the value of these colleagues becomes more apparent and better recognized.

Of the paymaster the same cannot be said. In his case the question is rather, "In the long run would it be more expedient to place upon the line officer the responsibility of government funds than to have a separate corps for paymaster's duties?" The answer does not follow of necessity. There is a moral side which should not be overlooked. Men are but human, and often weak. The lapse from virtue of a line officer acting as paymaster is not inconceivable, however improbable. What would be

the effect on the service, as a whole, should some lieutenant fail to respond to the demands made on his integrity? While certain as to the desirability of having all officers, excepting engineers and surgeons, available for naval duties, I cannot urge the substitution of the line officer for the paymaster without indicating a possible grave disadvantage. Personally I do not apprehend disaster, and I am quite ready to make the experiment. But in avoiding Scylla let us not fall foul of Charybdis. We must provide against a too frequent recurrence of this duty on the part of the individual, or we shall have, practically, the same set of line officers doing, habitually, the duty of paymasters; in other words, a virtual re-establishment of a distinct corps.

I have always been of opinion that the engineers are of too good material and too high an education to be consigned to the dreary round of watch keeping. There should be enough of them on board to supervise and direct, but the actual running of the engines ought to be entrusted to the present class of machinists, to whom the prospect should be held out of warrants for the most deserving. There is no greater comfort to a captain than a capable chief engineer and an efficient engineer's division such as I had lately the honor to have under my command. My experience afloat has served but to enhance an already good appreciation of the worth of the engineer officer, and I should not speak as I do if I did not feel that I am, in a humble way, advocating his own best interests.

The proposed amalgamation of the construction and engineer corps offers some advantages. It would at least get the constructors to sea occasionally, where they can learn that important and infrequently studied branch of their profession which concerns the behavior and habitability of ships. We are training up a body of men to design our fleet who, in spite of their ability and intelligence, are, and must continue to be, in practical ignorance of what a ship is under service conditions until they all spend a substantial fraction of their time afloat. The Department's orders in this connection initiate a practice full of benefit to the service.

Those who command and fight the ship have little enough now to say about what the Navy needs in the way of new constructions. Would their voice be more heeded if one bureau absorbed all the details of hull and engines? Does not the present division of responsibility provide a mutual break on the activities of our two principal building officers, producing a certain useful conservatism? The question raised is a broad one. It should not be answered hastily. I am not ready to advocate this amalgamation, for I think the matter has not yet received its due meed of discussion.

The essayist proposes to do away with the marine. His logic is strong, but may it not be just a trifle *ad captandum*? That such a consummation can ever be brought about I have no expectation or desire. As now appointed, the marine officer is a graduate of the Naval Academy, and at the outset as capable as his classmate of performing a line officer's duty on board ship. Why not utilize him as he stands? Why not count him, when embarked, as a line officer, subject to all the service demands



made on line officers, with but this restriction, that his division be always the marine guard? His opportunities for technical improvement while afloat are adequate. It cannot be held that his duties ashore are less naval or military than those of junior officers who wind chronometers, paint lighthouses on charts, teach school and perform clerical work under another name. In case of epidemic, or other cause reducing the quota of watch officers, no captain, if the emergency were really serious, would hesitate to give a graduate charge of the deck, even if he did happen to hold a marine's commission. In this manner, and without injury to any one, we might reap substantial benefit and yet adhere to the general lines of the essay. I only make this suggestion as a *tertium quid* that should be discussed thoroughly before reaching any ultimate decision.

The present two years' probation for the cadet might be useful if the final examination were shaped to recognize and evaluate professional aptitude and officer-like qualities. As matters now are arranged these years are simply a waste of time. What the Navy wants is the best *officers* out of any class, not those youngsters whose chief recommendation is ability to score well in a theoretical examination.

If the Academy failed to supply enough officers to the naval service there might be reason in giving commissions to enlisted men who could pass the necessary examination. I can perceive no good ground for discharging the qualified graduate and at the same time promoting the seaman. That such a scheme would work hard to the body of enlisted men is shown in the old Sabine experience, where a few apprentices got into the naval school and the rest were disgruntled.

With the essayist's remarks on the necessity of placing more reliance upon the petty officer I am in entire accord. The petty officer is what we make him. I hope to see the day when he will be what his title implies, an officer with duties and responsibilities proportioned to his rate—and as valuable to the Navy as the non-commissioned officer is to the Army.

Similarly, the bluejacket will rise to the standard his officers set for him. If they expect him to get drunk and raise Cain on all occasions he will certainly get drunk and raise Cain. If they expect him to keep sober, dress well and act like a decent, reputable member of society, he will not greatly disappoint them. I speak from experience, but spare you the details.

What would you say of a ship's company of a hundred and sixty-odd men, exclusive of marines, in which all but about thirty had deposit accounts, some as high as \$1000, and in which about \$2000 a month were habitually deposited? Would not this ship's company be likely to prove a credit to the flag through the steadying effect on so many of its men caused by their having a tangible stake in the world? Such a ship there has been in our Navy. The crew, collected just as they came from the guards, an average lot, were brought to an excellent state of conduct and discipline by the simple means of cultivating their respect for themselves, encouraging habits of economy, elevating the better element, and

mercilessly crushing the "toughs" and blackguards, usually the leaders on board ship, but, in this case, a cowed and ridiculed minority. This result is everywhere within reach, but not to officers who fail to set a good example, whose travels on shore extend no further than the nearest billiard saloon or hotel bar, and whose salary, after defraying the expenses of these journeys, is inadequate to the maintenance of a proper wardrobe.

In many ways the improvement of the petty officer and bluejacket lies in our own hands and calls for no departmental or legislative action. When we shall have exhausted all the means at our disposal for lifting Jack up, then, and not before, it will be in order to ask help from higher authority; but what can we expect from others when we who live with him and know him best, whose duty it is to make him a better man and a more useful factor in naval efficiency, fail not only to discharge but even to recognize this obligation?

Lieutenant F. K. HILL, U. S. N.—The service at large is certainly indebted to Lieut. Fullam for his very modern article on the "needs of the ship." There seems nothing to criticise and only a few details to add to his very excellent article.

To do a given amount of work with a limited number of men it is more economical of the force in hand to divide the work equally among all the men, rather than give the lion's share of work to one set of men and the lion's share of leisure to another.

The character of the seaman class to-day is such that a seaman is perfectly capable of doing everything that a marine does, either on board ship or ashore, while the reverse is not true. This has been proved in many instances. On the Isthmus of Panama in 1885, at Bluefields in 1895, and during the late war in China, are a few of the instances in which the bluejacket performed, with marked success, duties supposed to belong peculiarly to the marine. At Seoul the bluejackets worked side by side with the marines and outdid them in reliability and fidelity. Everybody knows the marines have been landed many times. Who did their work on the ship when they were absent?

The marines cannot do seaman's work, and the proof of this lies in the fact that they have never had the temerity to propose it. Why, then, *have* the marines, who do practically none of the routine ship-work, and are altogether a drawback because they do not do their share of the work? The only excuse for their being is that they have been.

In former days the men of the seaman class were pressed into service from the merchant marine; they were rough characters, and a certain force was necessary to restrain them. The marines were introduced. In this country, now, it is different; a large and increasing number of our men are of the apprentice and continuous service classes, who choose their profession at an early age and pursue it with all the love and *esprit* of the true man-o'-war's man, and it is an injustice to place over them any but their own class of higher rate; while the marines themselves dislike their enforced police duty. In contrast, the majority of marines



that powerful ships without an efficient organization of the personnel do not constitute a powerful navy. When this day comes—and may it come before our next war, and not as a result of it—*vested rights* will play a small part in the consequent reorganization. In this reorganization, especially if it be after an unsuccessful war, where the interests of officers conflict with the efficiency of the Navy, those interests must and will be sacrificed. If injustice is done, due compensation should be made in some way that would not conflict with the best interests of the service as viewed from the standpoint of the highest efficiency, and from no other.

Lieut. Fullam discusses briefly the subject of the number of line officers necessary afloat. It seems to me that we are in a transitory stage in detailing officers to ships. For many years the requirements of the battery and the engines have been the guides in the assignments of crews; but in the assignment of officers the watch-bill alone is still consulted. The *Indiana* and the *Castine* have practically the same fighting force of officers. A captain, an executive, a navigator, and five watch officers, with an indefinite and constantly varying number of inexperienced junior officers, are assigned alike to a battle-ship of 11,000 tons and to a gun-boat of 1000 tons. The English do very differently. They have fewer officers in their small ships and many more in their large ones.

I cannot agree with Lieut. Fullam about the paymaster and his clerk. Would it not be possible to turn over to the paymaster a great deal of the clerical work that is now done in the office of the executive, and thus relieve an officer who is overburdened, and add to the duties of one who would doubtless be glad to see those duties extended? Of course the clerk should be an assistant or cadet paymaster.

In our engine-rooms we want the class of men who run the engines of the great liners. On the larger ships there would naturally be a chief engineer and one or more assistants, according to the machinery and horse-power. But the watch duty should be performed by the class of men who handle just such engines in the *Paris*, the *New York*, and the many other magnificent steamers that carry a large portion of the commerce of our country. These men would be attracted to the service by warrants. In their examination no question of a scientific character should be allowed. We do not want college graduates looking forward to commissions and advancement; we want practical engine-drivers.

As to the marines, the question no longer exists afloat. So far as the sea-going officers are concerned there is now almost unanimity of opinion that the marine has no place on board ship. They have done good work afloat in the past, in the days of the press-gang and the cat-o'-nine-tails. To say now that their presence on board is necessary to quell insubordination and to enforce discipline is an insult to "the man behind the gun," who is better disciplined than the marine, more intelligent, and certainly more in touch and sympathy with his officers. Is it possible that any officer in command of a ship or of a division wants a marine to protect him against the insubordinate acts of his own men? If so, that officer is simply unfit to hold his commission. I once saw insubordination rampant on board. The ship was in dry dock, liquor

was adrift among the men, and perhaps one quarter of the crew were drunk. The corporal of the guard walked off in company with the sentry on the gangway and was joined by the sentry on the dock. The sentry over the brig disappeared with his prisoners, and doubtless all had a good time ashore together. It is fair to say that they left their arms and equipments to mark their posts.

We hear a great deal about the lack of initiative on the part of our petty officers. It would be surprising if under our present complicated system of discipline they did not hesitate to exert authority, the limits of which are so ill defined. Only consider the case of the forecabin of a single-decked cruiser. On board a vessel I have in mind that part of the ship is cared for by the port watch of the 1st and 2d divisions, and accordingly we should expect the petty officers in charge of those parts of the ship, one a boatswain's mate, second class, and the other a coxswain, to be in authority there. But no! a master-at-arms, third class (junior to both), is held responsible for the discipline and condition of this part of the ship. And to add to the complication, the corporal of the guard must also keep his eye on what goes on there. Here are three people exercising conflicting authority. Is it strange that our petty officers lack initiative? Why should not the boatswain's mate of the gangway exercise full authority in all matters in the part of the ship over which he has supervision? We have made him merely a mouthpiece for the officer of the deck, and we occasionally direct him to take charge of hoisting a boat or something of the kind. But why should he not be in complete charge as to discipline and everything else in his own gangway? Let any commissioned officer of the line put himself in the place of any petty officer and answer frankly if he would assert himself any more forcibly under our present system than our men do now.

Warrants as rewards for meritorious services are an excellent incentive. A carpenter who is a skilled mechanic and knows thoroughly the ship to which he is attached is invaluable. If he lacks these qualifications he is useless and in the way. It would seem that a gunner should also be an accomplished mechanic, familiar with the construction of guns and carriages, and able to take the tools in his own hands and do any work beyond the ability of any of his gang. The position of warrant officer is assuredly good enough to put such men within our reach. There are a few in the service, but not many. Two years, or more if necessary, in the workshops at the Washington yard, on the pay of a seaman gunner, after the preliminary examination and before the issue of a warrant, would probably result in a gunner worth having on any ship.

Unfortunately the discussion of the reorganization of the personnel of the Navy necessarily involves an attack on our present system. I would wish to say nothing unkind or criticise any corps or class in an unfriendly spirit, but the very existence of the marine corps on board ship as a means towards discipline is a criticism most galling to the real fighting force, the "man behind the gun."



Ensign W. W. PHELPS, U. S. N.—The service is fortunate in having its attention so admirably called to a point from which reorganization can be viewed by a united front on the part of the line of the Navy. It must be that a vast majority of the line agree in the main with the reforms suggested in Lieut. Fullam's paper, and it is only necessary for officers to come out and say that they think so and the weight of the unanimous approval of the line must be irresistible.

Hump or no hump, officers can agree on ship reorganization; so-called personal rights are not tampered with, promotion and retirement have nothing to do with it, and we stand together aiming for the highest possible efficiency of the ship, the end for which we are always striving, but now with methods which, when viewed in the light of experience with our modern Navy, are clearly a drawback.

Discussion will of course result in settling the details of the needed reforms, but much can be done to bring out more prominently the self-reliance and appreciation of responsibility that characterize many of our best petty officers. There is no finer material in any navy in the world than that we have in our apprentices when they reach their majority, and as far as possible acting appointments to seaman branch rates should then be immediately conferred. The encouragement will be beneficial, and the feeling of responsibility and habit of controlling men will be instilled in youth.

The excellent discipline prevailing on the Dolphin is due in some degree to the system of day duty in port, carried on partly by reason of insufficient officers to keep port watches. The petty officers have unharassed control of their men, and the ship's work is carried on with admirable despatch. The petty officers feel the responsibility and their manhood comes to the front. It would therefore be a step in the right direction to extend this system to all the third-rate vessels and gunboats and reduce the number of watch officers.

That the era of usefulness of the marines afloat is past is so well recognized throughout the line, and the demand for seamen to replace them so urgent and so strongly felt, that captains, executives and watch officers alike must look forward to their withdrawal from ships as the greatest bound reorganization can take towards homogeneity of the crew and efficiency of the ship, and I am happy in the conviction that we shall see this important reform instituted at no very distant day.

Lieutenant J. M. ELLICOTT, U. S. N.—I feel it an honor to be permitted by the Institute to discuss this paper, for its subject is one of the important problems of the day; one upon which every live, thinking naval officer must entertain decided views, right or wrong; and those views upon which there is found the greatest consensus of opinion should be put to the proof of practice as soon as possible.

Even if the *matériel* of our Navy were increased to the utmost now contemplated by the most sanguine persons, "command rank young" could not be assured without overloading the command and executive grades. It is in the power of the Navy Department, however, to give

us the next best thing—a release from the more subordinate duties before middle life. If it were made the rule that an officer should not be required to serve more than six years (two cruises) as a watch and division officer unless further watch duty fell regularly to his lot within the first fifteen years of his commission service, officers would cease this duty short of forty years of age and would then be available as navigators, ordnance officers, executives of third-raters, commanders of torpedo-boats or special vessels, or for personal staff duty, and would thus escape the more subordinate duties at that crystallizing period of their lives which is to make or unmake them as naval commanders.

I agree with Lieutenant Fullam that the substitution of a lieutenant and an ensign for a paymaster and his clerk *on board ship* would be all clear gain in fighting efficiency. This is no reflection whatever upon the individuals of the pay corps nor upon its necessity as a corps. Its extensive duties on shore, which would be manifolded to an incalculable extent in time of war, would afford ample employment for its whole personnel; but no paymaster need be afloat, unless, perhaps, a fleet paymaster on the *personal* staff of flag officers. The billet on board ship would afford another opportunity for utilizing the lieutenant who had completed his six years' watch duty. It would be a wise proviso, however, that a line officer could only serve one cruise on such duty.

I largely disagree with the author regarding engineer officers on board ship. His arguments in favor of more line officers are just as applicable to engineer officers. The multiplying of engine-rooms, of fire-rooms and of auxiliary engines makes their supervision by one officer in battle as impossible as the supervision of the battery by the captain. It is as absolutely necessary to have the moral and military influence of an officer's presence in every engine-room and fire-room, and perhaps at every auxiliary, in time of battle, as it is to have it at the battery. What captain, if a steam-pipe were cut, a compartment flooded, or a rumor of sinking were spread below, would exchange the influence of the officer for that of the machinist to prevent panic in the emergency? In a closed fire-room, under extra atmospheric pressure and great fatigue, amid the demoralizing din of battle, would not the firemen more surely exert their greatest endeavor under the eye and encouragement of the officer? Would not the officer, with his military training, his high sense of duty and his understanding of the situation, be absolutely necessary? Should such duty be any less congenial to the engineer officer than the direction of the service of guns to a line officer? It is equally important, and the men under immediate command are just as numerous. Moreover, we should soon have poor designers if they did not get plenty of active and mechanical duty in engine-running. I believe that the lower grades of the engineer corps should be considerably increased, while the chiefs are already sufficiently numerous. Engineer warrant officers would be excellent additions to the personnel, and would lessen the needed increase in the lower commissioned engineer grades. Above all things, however, the personnel of the engineer corps on board ship must be as absolutely under the direct command of the captain and



his representatives—the executive officer and the officer of the deck—as is the personnel of the line. On board of a large number of our men-of-war the chief engineer is in a higher grade than the executive officer, or holds a commission of older date in the same grade. This should never be permitted, for it causes a jealousy of control detrimental to discipline. No chief of command rank should be afloat, unless as a fleet engineer on a flag officer's personal staff. There is plenty of mere administrative duty for them on shore.

The marine corps is a body of trained troops mobilized at the seaboard under the direct control of the Navy Department. Its excellent usefulness has been demonstrated too repeatedly right down to the present day to need even a word of mention. Its existence is in no way jeopardized by withdrawing the marines from the ships. I do not believe that marine officers would oppose the experiment, and I believe that they would be perfectly satisfied if it proved successful. It is my further belief, however, that the withdrawal of the marines would be detrimental to our warships' efficiency. They constitute a guard which can be thrown ashore to protect consulates and other American property in foreign ports during periods of disturbance *without affecting the fighting efficiency of the ship they leave*. Their guard duty on board the ship is incidental to their presence there and gives them a natural and continuous employment, and they perform that duty exceedingly well. The very difference in uniform carries with it a moral effect upon blue-jackets which would be wholly lost if members of the latter branch were placed temporarily on guard over one another. The incessant training of the marine in sentry duty gives him an efficiency and a sense of responsibility for the maintenance of good order and discipline which the blue-jacket could hardly equal; not because the blue-jacket is at all inferior to the marine in capability for that particular duty, but because his training for it can only be a minor part of his general training, his practice of it would be more infrequent, and his intimate association with other blue-jackets would place him always at a disadvantage. The argument is that the withdrawal of the marines would give just so many additional men to the deck force, but it would not, in a working sense. There would be a guard detailed from the deck force daily, while the previous day's guard, needing rest, would be of little working value. Practically the same number of men would remain available for general duty as in the present condition. There would be a daily shuffling of gun captains, coxswains, helmsmen and men on minor details, both in port and at sea, because "so-and-so was in the guard." In action, of course, all but those actually on important posts would go to their guns, but it has been the experience of war that every man not in the powder division or engineers' force, be he marine or anything else, is, in action, available for the battery as its personnel is depleted. But argument upon this subject is wasted, for the proof is easy. Let the marines be withdrawn from the North Atlantic Squadron and their places filled with an equal number of blue-jackets. Leave the ships a year without marines, and, at the end of that time, call for reports upon

the subject; comparing for the same time the desertions, offenses committed, courts-martial, and the general fighting efficiency as shown by battle drills and target practice, with similar records for the preceding year. The question would then be settled once for all, and it is a question which should be settled without delay. The experience of a single ship for a few months is no proof and only aggravates the argument.

As for the marine officer, he is only found upon the larger vessels, where there are already five watch officers. If there were additional blue-jackets and no marine guard, would the marine officer be replaced by an additional line officer? The latter's *raison d'être* would be as a sixth watch officer, or as a drill officer and officer of the guard. Would he be allowed? Is it not more likely that those ships would have one officer less for general availability in action instead of one more? for the marine officer is a very available officer in battle.

I believe that the presence of the marine guard on board ship is decidedly conducive to efficiency at all times; that a separate, specially trained and distinctively uniformed organization in the midst of a ship's company is as necessary for the maintenance of order and discipline as is a uniformed police force in a city. Our endeavor should not be to cast out the marines, but to more thoroughly and properly utilize them. Give them a part of the battery, preferably superstructure, rail or bridge guns; they are trained marksmen. Give them a compartment to keep clean. They are not needed for coaling, for in modern ships with steam winches coaling can always be done faster than the bunkers can be trimmed, yet during coaling the marines are doubly needed as sentries.

I endorse most heartily every word said by the author upon the training of officers. I would add that instead of cruising in a sailing ship, even of the most efficient character, cadets at the Naval Academy should do their practice cruising in two modern, light draught, third rate cruisers having the usual auxiliary sail power and the latest approved weapons. On such cruisers engineer cadets and 2d classmen should do engine and fire-room duty, 3d and 4th classmen should do the duties of the seamen branch, while the 1st classmen should fill the billets of petty officers and, in rotational details, perform the duties of watch and division officers, and should work the navigation incidental to the cruise. A leaven of seasoned enlisted men on deck and in the fire-rooms should complete the complement. These two ships should coast in squadron as far north as the St. Lawrence, entering ports frequently and passing through all available coastwise channels. Their stops in port should be extremely short except when matters of professional interest detained them. Squadron evolutions, battle drills and piloting should be assiduously taught, and gun and torpedo practice held at least once each month, or three times during a summer cruise.

I have served on two cruisers of our new Navy, and have been in four squadrons of new cruisers. In all of these the schemes which Lieutenant Fullam suggests for the improvement of the petty officer and the blue-jacket were being so successfully applied that I believed the time had passed for any exhortation upon the subject. My experience has been



that the blue-jacket on shore readily learns to be a soldier and takes pride in military duty; that the petty officer controls his squad or section with intelligence and firmness, and I do not think that adding sentry duty to their other duties afloat is necessary to make them efficient soldiers ashore, whereas, if they are properly drilled in company drills and landing parties, they will not be found wanting *should an emergency arise* requiring them to do sentry duty afloat.

Lieutenant BRADLEY A. FISKE, U. S. N.—I am strongly in favor of the withdrawal of marines from our modern warships. My reasons are exactly those stated by Lieutenant Fullam.

Lieut.-Comdr. RICHARD WAINWRIGHT, U. S. N.—In attempting to discuss Lieutenant Fullam's paper I have met with the same difficulty that has been encountered by many others, I imagine, who, finding the subject so well treated and agreeing thoroughly with the main conclusions, are both unable and unwilling to criticise, and yet believe the paper to be too important to be allowed to pass unnoticed.

No one can dispute the fact that the personnel should be so organized as to best promote the fighting efficiency of the ship and of the fleet, and that, if necessary, the rights of the Government must prevail over "vested rights." Still it would be better for all, and would tend certainly to aid in reorganization, if no "vested rights" were disturbed.

For the engineer corps, I think they are mistaken in advocating increased numbers and increased duties. No one has more reason to be proud of his work in forming the new Navy than the naval engineer. Why should a corps that is capable of designing and constructing engines, and has been so successful, desire to drive them also, and, worse still, be forced to stand cold iron watches and make tidal observations in the bilge? Are not their present successes largely due to the fact that, because of the many new ships built and building, they have been forced into designing, constructing and superintending, leaving the engine-driving to the machinists? It seems to me that their influence and position will be stronger and the Government's work better done if the corps be composed of comparatively few commissioned officers devoted to designing, constructing and superintending, with a large number of warrant officers to drive the engines, than if it be composed of a large number of commissioned officers who combine the duties of both the trade and the profession.

Also as to the marine corps, they are no longer necessary on board ship as policemen or as small-arms men, so they wish to undertake to fight the guns and to coal ship. The training of seamen and of marines differs greatly; either the men at the guns should be all marines or all seamen; the men of inferior training must go. The officers who are to fight the ships know that seamen are best fitted to fight the guns.

Historically, the marine antedates the sailor in the Navy. His record in war or peace is second to none; his appeal for maintaining his "vested rights" is strong and will receive recognition even in face of

service requirements. How can they be served better than if held as an expeditionary force organized as a skeleton brigade? They may not go on the sea so often, and they may be relieved of some of the duties of watchmen at the navy-yards, but they will be able to keep up their old-time efficiency and will have logical reasons for their existence. Nothing is more expensive than an expeditionary force made up from men carried on regular men-of-war where it requires many vessels to give as large a force as can be carried on one transport. Landing parties for the protection of a consulate or for visiting punishment upon some barbarous tribe, where the ships are close at hand, are most necessary; but if a real expedition is to be undertaken, either requiring a comparatively large force or to go to a distance from the ships, marines would be more effective and less expensive. As our interests increase and our commerce extends, such a force will be required sufficiently often to prove its value, and, when real war comes, who can question the necessity for marines to defend naval bases?

I believe the medical corps of the Navy should have charge of the Marine Hospital Service, and that sea duty, being distributed among so many, should form only an incident in the career of a medical officer. In time of war we would then have a large corps of trained officers to take charge of the hospital ships and temporary hospitals at the various bases, as well as the permanent hospitals. During both war and peace they would take on board ship apothecaries and nurses trained in their own schools. Think what a splendid corps this would be for war or peace, particularly if organized and controlled by the present energetic Surgeon-General of the Navy.

The Bureau of Supplies and Accounts is rapidly centralizing the purchase and inspection of all supplies and the control of all accounts. Officers with a thorough business education are necessary at navy-yards and stations, and in time of war to visit various sources of supplies, to complete large purchases and to distribute the supplies from the several bases. One officer of experience is necessary to make purchases and supervise the accounts of each fleet, but the small amount of such work required on a cruising vessel could be performed by an officer trained to fight the ship. There are only four officers in the pay corps not actively employed—one on leave of absence, one waiting orders, one settling accounts, and one on sick leave. Those now on board ship would be required, in time of war, for more exacting duties on shore, and might be stationed there now, where they can become intimately acquainted with the business of purchase and inspection as well as that of accounts.

With the personnel of the Navy thus organized, there would be little room for conflict of authority or struggle for precedence, and on board ship all officers, except the superintending engineer and the medical officer, would be trained to fight the guns and to handle the vessels. The interests of no corps would be injured in the reorganization, and the Government would be greatly benefited by the increased efficiency of the naval service.



Lieutenant A. P. NIBLACK, U. S. N.—Lieutenant Fullam's essay is vigorous, healthy, incisive and convincing. That it did not get the prize must be regretted by all who read it, as the subject is a vital one and the method of treatment most able. As stated in the essay, a perfect military system would require that every officer on board ship should be available for any service in connection with its offensive power. A very desirable approximation to this in our Navy would at least seem to demand that all the officers, regardless of the departments they are in, should be interested in, or at least not hostile to, all things military.

The installation of the commanding officer on board ship as the supreme mechanical and automatic weapon, and the furnishing of him with the proper facilities for executing the enormous trust placed, necessarily so, completely in his hands, is at the very root of all questions of organization and discipline. The delegation of part of this authority to the executive officer as his representative is as much a military necessity as the giving of it at all to the commanding officer. The effort to evade this and to belittle the position of the executive wantonly strikes at the very root of all military organization. Shall the authority on board ship be parceled out to various departments, as contemplated in class legislation now pending in Congress? It seems almost in order to ask shall we hereafter elect commanding officers by ballot.

The prospect of a marine officer as a regular watch and divisional officer; or of a line officer commanding marines, or acting as paymaster or chaplain, or standing an engine-room watch; or of an engineer commanding a ship; or of everybody being called lieutenant, or commander, or captain, or admiral, is not a thing to get stamped over, provided each officer in each position understands the job and has the military spirit. Put any officer on the bridge of a ship from any corps and he will find that he cannot run the ship successfully unless everybody on board occupies just the relation towards him as all do now towards the captain and executive. One does not become a line officer simply by walking up and down the bridge with a trumpet in his hand. Back of him is an intricate profession, alongside of which the purely technical ones are simply specialties. It does not vitiate the argument to say that some of the line officers are not up to the mark professionally.

The duties of all staff officers on board ship can be taken by civilians of *special* talent after a few months' training, principally of a military character. Highly scientific doctors are not nearly so important as that what few we have shall be subordinate and shall have the military spirit. As all officers and men are above the normal as to physique, why make the entrance and other examinations so high for the medical corps that the corps cannot be kept recruited up to its full number? The Medical Corps as a body may be interested in keeping its standard up to the highest. The interest of the Navy as a fighting organization is rather the other way. The very smartest and brainiest doctors feel that they can do better in civil life, and certainly the practice on board ship is not calculated to keep a man in the front rank of his profession as compared with practice on shore. A contented doctor, with talents

commensurate with the pay he gets and work he does, ought to be good enough for our Navy. The record of our Engineer Corps in the design of modern marine engines and boilers is one of unbroken success. Nothing in our Navy is deserving of more credit or of greater recognition, yet when this machinery and the boilers are installed in a ship and satisfactorily tested, is it demanded by common sense that the young officers and others who put their brains into this work shall go to sea and stand a machinist's watch? Must a chronometer-maker cruise with his instruments to keep them going, or is it simply a question of *intelligent* care and supervision? While on the one hand the Medical Corps tries to be too select from a military standpoint, the Engineer Corps is dead-set the other way. The marines are the ones who really have a grievance. In all other countries save Great Britain, the sea-coast defenses are in the hands of or controlled by the naval establishment, as common sense and reason dictate should be the case in ours; but even in Great Britain they draw some of their marines for service afloat from the marine artillery. Our Marine Corps is in a very unfortunate position. It has not men enough to properly carry on guard duty on shore, and to increase the corps is to agree to a perpetuation of existing conditions. For my part I believe Lieut. Fullam to be absolutely and thoroughly right; but if the authorities decide otherwise, then in the name of reason let them go to the batteries, man the guns, clean ship and become a part of the ship's working force. A modern officer or blue-jacket must be a good deal of an engineer, marine and sailor combined. It would seem the part of real wisdom to draw on the artillery of the army for marine duty on board ship if we are to have the present system. Section 1619 of the Revised Statutes says, "The Marine Corps shall be liable to do duty in the forts and garrisons of the United States, on the sea-coast, or on any other duty on shore, as the President, at his discretion, may direct." It would be a happy solution of part of the difficulties and give real meaning to the service of marines afloat, to detail marines for sea-coast defenses and send the artillery to sea for awhile. Why not?

Most of the trouble in the Navy personnel is unavoidably due to the fact that we are all restless under the revolution in the profession in the last ten years or so. Our present organization is in many ways a misfit, we have somewhat outgrown it. Personally, I would be particularly glad to see the Engineer Corps have supervision of the entire question of all mechanical construction (including guns and gun-mounts) and of all auxiliary machinery on board ship, and I would be very glad to see the Marine Corps in charge of the sea-coast defenses, and, for educational purposes, on board ship (not as now as ship's police). Line officers are artillerists, tacticians, sailors, sea-goers, and to them should be given command at a reasonable age and, practically, constant sea duty. There are a number of officers in all corps mentally too old, or too unadaptable, or too disillusioned or soured by unfortunate experiences, or too imbued with the traditions of the past, or too relatively inexperienced at sea compared with officers many years and many grades



their juniors (see Navy Register), or too out of touch with anything but shore duty, to even agree on any measure which contemplates a reorganization. Irrespective of corps, those who have the military spirit and are not over-due for sea are in touch to-day. The discord and bitterness are personal and selfish. Whether or not any reorganization does take place, the Navy is steadily getting better every day, and every one is becoming more efficient. Officers cannot serve in the newer types of ships without knowing their business, particularly with a live flag officer on deck.

Lieutenant Fullam has done a great service to the Navy.

Lieutenant G. B. HARBER, U. S. N.—I have read the essay of Lieutenant Fullam on "The Organization, Training and Discipline of the Navy Personnel as Viewed from the Ship" with great pleasure and interest. It expresses with clearness and force, greater than I had done to myself, many views which I have long held, and some to which I am a recent convert.

I do not wish to discuss the essay at length, but while there are minor points to which I do not assent, I desire to express my hearty approval of the point of view chosen by the essayist, and of the essay as a whole.

Lieutenant ALBERT GLEAVES, U. S. N.—I have served in two ships without marines, and my opinion is that the Navy is approaching the stage in its development when their places can be supplied with advantage to the service by blue-jackets. The drift is inevitably in this direction. On the Monadnock the blue-jacket performs the duty of orderly, sentry and corporal of the guard—

"'E's a sort of a giddy hermaphrodite, soldier and sailor too"—

and it is a pleasure to testify to his trustworthiness and zeal.

In regard to permanent ratings, they should be restricted by such cast-iron qualifications, and the same remark applies to continuous service certificates, that only the most deserving can ever get them. I have recently been shipmate with four "permanent" quartermasters; none of them could read signals, and at least two spoke such broken English as to be almost unintelligible. The Department's order concerning the rates of coxswains and quartermasters is a long step in the direction of making permanency in rating very desirable.

1st Lieutenant CHARLES A. DOYEN, U. S. Marine Corps.—The writer of this article would approach with diffidence and caution an essay on the above-mentioned subject if it did not involve a discussion of the advisability of dispensing with marines on board men-of-war in our Navy; but as his own experience and opportunity for observation have been nearly, if not quite, equal to those of the essayist, and his knowledge of the duties and capabilities of the Marine Corps is certainly greater, he feels that he can with some degree of confidence comment on the portions referring to that corps.

The essayist advocates dispensing with paymasters and marine officers entirely, and reducing the number of engineers, their places being filled by line officers. Now, while convinced that the line of the Navy is, and ever must be, its backbone, the writer ventures the opinion that the other branches can only be dispensed with at a great sacrifice of efficiency and economy. The efforts of a few line officers to assume the duties of officers of other branches would almost cause one to think that, under existing conditions in our service, they are so numerous, or find their own particular duties so light, they must enlarge their sphere of labor to show some cause for not having their number reduced. Their duties are, however, as a matter of fact, second to none in importance, and if conscientiously performed, and an officer keeps up to date in the details of his own branch, he will have little time or inclination to master the details of others. It is suggested that any such organization as the one proposed would result in the raising up of a type of naval officer indifferent in all the branches of his profession and master of none. As an army needs, for a successful campaign, all the various branches, engineers, artillery, cavalry, infantry, quartermasters, commissary, medical, etc., so men-of-war, for greatest efficiency in war or peace, need all the branches now on board ships.

We are living in an age of specialists, and all-around workmen cannot compete with specialists in their own particular branch.

There is something sublime in the way the essayist waives aside the lessons taught by centuries of experience and observation in foreign navies, when he says, "No matter what may be the custom in foreign navies, this question should be considered from the standpoint of the greatest good to the greatest number," etc. In other words, don't let us profit by or pay any attention to the conclusions arrived at by others; their years, yes, centuries, of experience and observation are as nothing compared to our untried theories. Comment is unnecessary.

The essayist says, "The few duties now performed by marine officers afloat could be assigned to line officers, who would also be available for all other naval work." This is, in a measure, true, but would these duties be any more efficiently performed? Are not about 62 per cent of the line officers of the Marine Corps now graduates of the Naval Academy, equally competent with line officers of the Navy of their date to perform "all other naval work"?—perhaps not quite as well, owing to lack of practice, but still satisfactorily, and they certainly are of more value in operations on shore, which are not the least important of the duties that fall to a navy in time of peace or war.

The writer takes exception to the essayist's statement that line officers of the Navy have a military training. Where do they get it? Certainly not at the Naval Academy, where they are given the merest instruction in the "manual of arms" and a few simple company and battalion movements, these from a drill regulation book which was compiled by naval officers and was no sooner issued than it was followed by a volume of corrections and additions, and is now soon to be discarded. Military training comprises among other things practical and theoretical instruc-



tion in the principles of "strategy," "minor tactics," "fire discipline," "field engineering," "military topography" and kindred subjects. Drill regulations are the ABC of military training, and, principally, the means of perfecting discipline. Marine officers are now instructed in all these subjects and are required to pass rigid examinations in them before promotion; therefore, being graduates of the Naval Academy, and having some military training, may they not, without presumption, claim to be as competent and available for "all-around work" as line officers?

Again the essayist says, "When naval forces are landed for service on shore a line officer is usually in command, especially if the force is large and the duty correspondingly important." Are we to infer from this that marine officers are less competent for this duty? That a marine officer should command mixed detachments on shore is eminently proper and contemplated by Regulations, which place the marines on the right of the line in military formations, and assign to command the force the senior in rank, be he a line or marine officer. From the nature of the organization of the Marine Corps, however, and the fact that the highest rank of officers afloat is that of captain, corresponding to lieutenant in the Navy, it is practically impossible for any landing party of size and importance not to contain many line officers senior in rank to the marine officer; and in naval shore operations, not originating in a fleet, care is taken by the naval authorities to detail a line officer senior in rank to any available marine officer, even though the marines outnumber the sailors four to one. Why this is done needs no explanation here, but I do not fear contradiction when I assert that 'tis not because marine officers are incompetent to command.

It would seem that the essayist realizes the importance of having on board ship a body of well-disciplined men whose specialty is operating on shore, as he says, "It is unfortunate that some officers are inclined to deny the importance of landing forces. When we consider how frequently our men have been called upon to land in all parts of the world, it would be reasonable to say that a naval officer *is quite as apt to be called upon for active service with men under arms on shore* as with the ship's battery at sea. It follows that officers must prepare themselves for this, important practical work, and must not glory in the fact that they know or care nothing about it." But he fails to fully grasp the importance of it when he says, "A simple drill book and a simple manual are needed, that is all."

Again we read, "In the recent landing drills of the North Atlantic Squadron, line officers who had never before had an opportunity to witness or practice the new 'extended order' grasped the subject at once and handled the blue-jacket battalions in a manner that showed a peculiarly intelligent conception of all the practical points involved. The onlooker could not fail to see that the line officer is equal to all military duties, and that the infantry part brings the least strain on his intellect." This would depend somewhat on the onlooker's knowledge of the subject and his ability to judge, but having participated in many

such drills I can easily understand that no intellect could be strained by acquiring the amount of military knowledge displayed on that drill ground.

The merest tyro in military knowledge can shout orders from the drill-book and march a battalion around a field, but when it comes to handling troops in the presence of an enemy I submit the statement that the average line officer, in making a judicious selection of ground, preparing it hastily for defense, disposing of his forces to the best advantage, providing for the security and information of the whole, would be as much at sea as the essayist is when he states, after a dissertation telling us how simple it is for a sailor to become a soldier, and how difficult the reverse: "The assertion is ventured that there has never been a system of infantry tactics which requires on the part of men so high a state of discipline, so high an average of personal intelligence and such quick, united action as was demanded of seamen in the spar and sail drills on board a well-drilled ship, 'Fours right' and 'Charge bayonets' being less strain on a man physically and mentally than to pass an earring or furl a topgallant sail." The essayist evidently means "Infantry Drill Regulations," not "Infantry Tactics"; there is considerable difference, and I take it for granted that his essay deals, not with the conditions existing in the old Navy, but the new, and modern men-of-war's men on cruisers, battleships and coast-defense vessels don't pass many earrings or furl many topgallant sails.

The statement of the essayist that "a general commanding an army properly decides, if anybody can, how much infantry, cavalry and artillery are needed to conduct a campaign," taken in connection with his proposition to make a ship's company "homogeneous," gives rise to the query: Why not have a "homogeneous" army composed entirely of infantry and uniformed exactly alike, who, in times of peace, could be drilled and instructed as artillery, cavalry and infantry? Then in action they could first, as artillery, shell the enemy, then as infantry move forward to the assault, a portion mounting horses when it comes time to charge the demoralized enemy.

The assertion is continually made in the essay that marines afloat prevent the development of the sailor; this is not so. Nobody is or can be responsible for the development or non-development of the sailor but his officers and himself; the matter rests solely in themselves. There is no law or regulation to prevent sailors from performing sentry duty or being orderlies to commanding officers, for purposes of instruction or otherwise; instruct them in guard duty; give them military instead of naval training if that would better meet the requirements of the Navy, but don't begin by dispensing with marines, the only military body in it, and then attempt to bring sailors up to their military standard, for, from the very nature of attending circumstances, a good sailor would be spoiled in making a poor marine. As the essayist elsewhere suggests, encourage sailors to be self-respecting and trustworthy by putting responsibility on them and trusting them; give petty officers charges of squads or guns, etc., at drills; put him in charge of a boat or a working



competition, toward making a harmonious rather than homogeneous whole, instead of toward stirring up strife and dissension by unjust reflections and comments without foundation in facts. Homogeneity, as advocated in the Navy, is a snare and delusion, and, I believe, simply a cloak for selfish motives; it would destroy competition, the vital spark of progress.

Lieutenant C. S. RICHMAN, U. S. N.—I have been requested to make suggestions and criticisms in this instance. To that end I have to say that my experience in practice leads me to approve generally the arguments as set forth in the essay; however, there are two or three points that might be elaborated even still further, viz., I believe in the "man behind the gun" and the man that can direct men (you want sailors on dark nights); plenty of *competent* men to handle the lock-string, or, to be more modern, "electric primer." The combatant force should be as large both in officers and men as the accommodations will allow. As to the marines, while I have always admired them, the object for which they were designed on shipboard is obsolete. In my position as navigator of the Raleigh it has often been apparent to me that although the Regulations require me to handle the ship as officer-of-the-deck *in action*, I have not even a messenger to assist me at general quarters. True, there are thirty marines, but they are a separate organization and command. Thirty blue-jackets in their place could man a boat and form a crew to take charge of and take in a prize; now it cannot be done on this ship without disabling an entire division.

The suggestions as to the War College are timely, and, to my mind, worthy of especial consideration; also the suggestions as to the warrant officers and the responsibility that should be given to petty officers and enlisted men. I have had occasion to note the large number of apprentices who do not serve out their enlistments, or having served their time, fail to re-enlist. There is doubtless a good reason for this, viz., a boy of 21 years or less is not satisfied with three months at home; he passes the day to re-enlist, then seeks employment, but in a few months would return if it were not that he loses privileges—comes in as a tramp and goes to the bottom and commences all over again because he has no *trade* except that of a *seaman*. On the other hand, a man with a trade can enlist as a landsman and get a rate. Still, between 17 and 21, the very time that the same landsman might enlist and in that time learn any trade on board ship, and, incidentally, become a seaman, is barred. Referring to the men and their messing and the remarks generally in that connection, I agree heartily with the essayist, but take occasion to call attention to a previous paper (published by the Institute) from the pen of Lieutenant-Commander Delehanty, U. S. N., which covered the whole ground. I was personally witness to the successful workings of the method he described, and only regret that in that matter he was as much in advance of the times as the new Navy, with new methods, is now behind his suggestions of years ago. The ships to come should have one mess for the men, one steward, one bill,

etc., but the steward and cook must be considered in the design of the ship and appropriate accommodations provided. *The mess chest must go.*

Lieutenant C. E. COLAHAN, U. S. N.—I have read with great interest the valuable essay of Lieutenant W. F. Fullam, and were most of his ideas carried out, the Navy, I am sure, would be greatly benefited.

As our service increases, and increasing it certainly is, the number of line officers must be likewise increased, though it is my opinion that some of the smaller vessels do not need as many line officers as they now have—I speak of the gunboat class—two might be withdrawn from nearly all of them, the warrant officer taking their places. The petty officer, trusted as he should be, and given a position of more responsibility, could relieve the line officer of many duties. I believe the pay officers should remain as they are, but it is suggested that appointments should be made from the graduates of the Naval Academy, and that in addition to their ordinary duties as pay officers they should always be officers of the powder division, and that their examination for promotion should have their fitness for the performance of this duty in view.

The warranted class of officers should be increased and extended to the engineer branch of the service, which would do away with the demand for an increase in the number of commissioned officers in that branch.

I am a thorough believer in the necessity of educating officers in piloting and in the practical study of the features of our coast; it cannot fail to be of inestimable value to them, and I am quite in accord with what this essayist says on this subject. The blue-jacket is not trusted sufficiently. I think officers should be a little more generous in the matter of liberty and not keep such a tight hold upon the purse-strings of the enlisted man, provided he has a sufficient balance to keep him in excellent condition as regards clothing, mess account, etc.; the enlisted man earns all the money he gets and has a right to spend it. Thriftiness should of course be encouraged. In regard to the question as to whether the marines should be continued in service afloat or not, it is simply necessary to consider whether it would be for the benefit of the ship to retain on board a number of her people whose duties are circumscribed, or to replace them with those who could be called upon for all duties; it is not a question as to whether the line officer and his men can perform certain duties as well as or better than the marine officer and his men; they are persons of precisely the same degree of intelligence and the same may be expected of both.

The marine officer, graduate of the Naval Academy, may be perfectly competent to take upon himself all the duties of the line officer. Well and good; let him be made a line officer. His men, however, are not, from their training, capable of doing all the duties of the seaman, and this is the reason that, in my opinion, they have no place on board ship. I hold that it cannot be expected to require the Navy to be proficient in the higher features of tactics on shore, nor will it ever be required of it. The Indiana would be far better off as a ship if her sixty marines



essential than ever. In the direction of the ship upon tactical principles and for development of gun fire, torpedo and ram, a profound and exact knowledge of the powers of his vessel, a quick apprehension of the relation of the adversary in any circumstances of wind and sea, an intuitive perception of the correct course to be pursued, are elements of decision which characterize only the men who spend their lives in the study and practice of naval warfare. In no other profession is it so fatal to be "caught aback." This is well understood in foreign services, and it is to be regretted that the circumstances of our own Navy do not permit officers to spend their lives more continuously at sea. For mere landmen by habit, however extensive their naval thought and acquirements, cannot control a ship under way with that facility which comes only to the practised seaman.

In brief, your ship will fail in action unless the captain and those who succeed him in command are seamen, embodying life-long naval thought and action.

The same principle of habit, of life-long environment amid waves, of meeting all the surprises and accidents of the sea, of perceiving instantly the appropriate or necessary action in difficulties, points to the sailor as the man for the gun.

A dozen men habituated to the sea are worth, in the control of the guns, a thousand bred and trained on shore. Modern guns of heavy caliber are moved chiefly by machinery more or less intricate, and they are managed in all navies by the seamen. Sailors, accustomed to the more simple tacks and sheets of days not long past, have readily adapted themselves to the new conditions and become a living part of the new machines. As we all know, they pick up the tricks of modern gun machinery with wonderful readiness and handle the guns in any weather. With their sure sea legs, they need only practice at sea and in the fleet to master the guns. The sailor is to-day, as he has been through centuries, a certain reliance, and it is to him that we must trust our guns.

If the sailor, who works the ship and takes care of her, is not the best man for the gun, it is time the best man should be found. If it be true, as the essay says (p. 108), that it has been stated publicly that seamen are no longer needed in the Navy, we of the Navy ought to know what class of men should replace them, and we cannot be too earnest in the inquiry. I do not hesitate to affirm that in loyalty, discipline, intelligence, the blue-jackets are inferior to no other class of men, while in adaptability to all kinds of work and general usefulness he is superior to all others for service afloat.

The sailor class should be fostered, and the gradual increase in the number and capacity of our seaman gunners is an essential condition of our naval efficiency.

The adaptability of the sailor class to all kinds of duty is one of the peculiar elements of his usefulness. The sailor will manage a boat under oars or sail, heave up and handle heavy anchors, work aloft as required, coal ship, work as fireman or coal-passer, man the heavy guns, take charge of the rapid-firing guns, steer the ship, land as an infantryman or with

field artillery, perform many other varied duties, and take his pork and beans with equal readiness. And he will do any duty in weather which will make a landsman dread that he will die, and, later, fear that he will not die.

The sailor to-day can do three-fourths of all the work required in men-of-war. In all navies the sailor class has been found to be the most efficient for varied duties or all-round work.

The training of the seaman, both officer and man, is best accomplished at first in small vessels under sail. There is no other kind of experience by which the seaman acquires so rapidly and thoroughly an instantaneous perception of conditions and readiness of resource. This training should begin very early in life; and its complement is the later service in modern war vessels. The practical education is completed by our present system of instruction in guns, torpedoes and electricity. Our Navy has now, fortunately, a large body of officers and men who have developed under this progressive instruction.

The men for the engine-room should be trained upon parallel lines. Precisely as the seamen rise to be warrant officers and chief petty officers, the trained engine-room men should grow into warrant engineer officers, machinists, and chief petty officers of the engineers' force.

To accomplish this development in training most systematically and effectively, the seamen and engineer classes, both officers and men, whether at the Naval Academy or in the service training ship, should serve, before reaching manhood, in small vessels, fitted for sailing or for steaming, or for both.

Training in the shops on shore should be limited strictly by its correlative and subordinate importance. For, although the machinery of almost all great industrial establishments is far more complex than any installed on board ship, it is the habit of life at sea which must be cultivated early in connection with training in the machinery which both seaman and engineer must use. It is my profound conviction that such training only can give us the specially skilled sea people we ought to have for our superb warships. We should live more at sea.

At the head of the crew is that noble body of leading men, the petty officers. Their services should be enlarged, and they should be treated with entire confidence, in a word, *trusted*. I think that even now we do not make the best service out of our petty officers, do not give them full control as such. Men will prove reliable largely in the degree in which reliance is placed upon them. But how can we expect the blue-jackets to respond to confidence when they see even their petty officers not appropriately employed and often under supervision of sentinels? The Navy is slowly but surely breaking away from unnecessary watch and espionage of the men. We shall see the enlisted man fully trusted and respected in the care of his ship and its duties, and his character raised by a systematic confidence in his integrity and inherent worth.

The gun is the most important part of a modern war-vessel. Certainly every pair of turret guns should have at least one officer. It has been suggested recently by an officer experienced in handling turret guns, that



ated if possible. By non-combatant element I mean that large class of men on board our ships who do not take part directly, and are not trained to take part, in working the great guns and other weapons. At general muster the long line of non-combatants is appalling. Our crews should be homogeneous in nationality, in class, in capability, and in training. The able seaman will be in the future, as in the past, our force, our trusty agent, and every other type of men on board should be assimilated to him. The engineer's force should be trained at the great guns, at the secondary batteries, with small arms, and in the boats. Few servants should be enlisted; indeed, they might be taken from the sailor class. Abolish paymasters' clerks and naval cadets at sea, and put the remaining steerage officers into the wardroom. In conflicts between ships, ramming is most probable; ships will come together; and, for such an event, every man in a ship should be trained, each with a proper weapon, to keep his own deck or to go on board the enemy.

"The argument of homogeneousness extends to the marines and would exclude them from a vessel of war. It does not seem wise to have a special class of men for one arm, men who do not work in all the duties of the crew. The marines are now employed on board chiefly as sharpshooters and as sentinels over Government property and refractory sailors. But the seamen of our Navy must become sharpshooters, and they must learn to guard themselves and their ships. A proportionately large part of the crew must be employed in the engine-room; outside of it there should be but one class of men, the able seamen, who should be entrusted with every duty and office of the ship under the commissioned officers.

"I have outlined an opinion, in which many officers concur, based upon the principle that no man should be retained on board who is unable to perform one, and, usually, more than one, of the essential duties of the vessel of war. The elementary training should be done in separate ships. There is no place in a ship prepared for war for naval cadets and clerks, who take up the room of officers; nor for boys and servants, who exclude as many fighting men ready for any work with any weapon in any part of the ship; nor for yeomen, writers, schoolmasters, ships' corporals, lamplighters, tailors, barbers, buglers, printers, painters, etc., unless they are seamen or form a part of the fighting force."

Lieut.-Comdr. URIEL SEBREE, U. S. N.—For the most part I agree with what Mr. Fullam has so well said in his article. In regard to the reorganization, as he says, the efficiency of the ship, and, therefore, of the Navy, is what should be considered. From the nature of the problem it is impossible for the officers to generally agree. It is something for Congress to decide what is best for the Navy and the country irrespective of whom it hurts or benefits. If it were possible for the naval committees to spend a month on board vessels in commission, with a view of getting information as to what is needed, they would frame a bill which, in my opinion, would be acceptable to the line officers as far as the line and staff features are concerned.

The idea of having a vessel detailed for duty on the coast for the instruction of officers in regard to harbors, piloting, etc., is a good one, but it is hardly probable that one will be spared for that purpose. The Coast Survey is a most excellent school for officers in that respect. The light-house inspectors also have unusual facilities for gaining knowledge of that kind in their districts. If it could be done, each coast or lake district, thirteen in all, should have a lieutenant or ensign detailed as assistant inspector for six months or a year. If this could be done we would soon have a large number of officers with accurate knowledge of parts of the coast. At present the Light House Board, properly, does not want more officers for inspectors than are absolutely required to do the work of the Light House Establishment. But I do not think the board would object to assistants who were sent with the object above-mentioned, provided no additional expense was required of the Light House appropriation.

In regard to warrant officers. Some years ago, when ordered as executive of a ship without sails, I thought a boatswain was not needed on that class of vessels. Since making the cruise without one I have changed my mind. A good boatswain is a very valuable man to have on board a ship whether she has sails or not. In case of war, an officer ordered to command a merchant steamer would be fortunate to get one or more warrant officers. They would at once be doing the duty of commissioned officers. Commanding and other officers should be on the lookout for eligible men in their crews and recommend them to the Department for acting appointments.

As for the blue-jackets, including the petty officers, most officers as they grow older in the service respect the blue-jacket more. They are the best men to be had for all-around work. Suppose an officer had some desperate and important duty to perform that was not necessarily in the usual line of the blue-jacket's work, such, for instance, as transporting 100 men two or three hundred miles by rail, and then to blow up the lock of a canal or to seize some important position on a river or the coast. If he had the choice of the local militia, any other militia, the regular army or marines, or 100 blue-jackets of the regular landing force of a ship in commission, I think few officers would hesitate about choosing the blue-jackets first.

As to marines on board ship. On my last cruise we had 36 marines with a total complement of 337 men. The marines were very good men, but I would have been willing to take 20 or 25 blue-jackets in place of them. When coaling ship it does not improve the disagreeable situation to have from 15 to 30 marines lying around in the port gangway waiting for the sailors to get the coal on board.

I think that the sailors can be taught to do all the duty now done on board ship by the marines, and if an equal number of blue-jackets are put on board in place of the marines the ship would be a more efficient fighting machine. Let the marines stay on shore, as suggested. I would not do away with the "vested rights" of the marine officers. It might be for the benefit of the service to give all marine officers who are graduates



of the Naval Academy commissions in the line with their own class. This would trench on "vested rights" of the line officers below them, but if it benefited the service it ought to be done.

As to engineers. Two commissioned engineers on large ships, and one on small ones, are enough. It is not business-like to have a highly educated commissioned officer doing the work that a machinist can do and does do on merchant steamers. Make the machinists who are worthy and competent, warrant officers.

In this connection I think all the machinery on board should be under the general charge, as to design, installation, repairs and operation, of the engineers. This thing of having one engine under the navigator, another under the executive, and others under the chief engineer, is not conducive to efficiency or economy and should be changed. Put them all under the charge of the officer whose education and experience ought to make him the best and most efficient man for that work.

The duties of paymaster on board ship could be efficiently performed by a line officer. It would give one more military officer. Do not appoint any more paymasters, and whenever a vacancy occurs in the Pay Corps make one more line officer. The younger men in the Pay Corps will soon have so much rank that they will not have to go to sea any way, so no "vested rights" would be troubled.

Rear-Admiral S. B. LUCE, U. S. N.—I have read this well-written and, with one or two exceptions, well-considered essay with unusual interest. It reached me, unfortunately, too late to offer but a few hastily-written criticisms.

The first passage that strikes me is the following, on page 84: "It is from the deck of the ship that the problem should be considered." This is one of the few indications that have lately come to my notice of a reactionary movement against the tendency of the whole Navy to get everything on shore. It is a hopeful sign of the times.

The remarks on "vested rights" are sound. There has been too much class legislation for the Navy. A certain captain in the English Navy, with whom I was acquainted, an officer of exceptionally high professional standing, was about to be retired as a captain, having reached the age limitation before his time for promotion to flag rank. On expressing my sympathy for what seemed a great hardship, he said: "It is hard in my individual case, but our system of retirement and promotion is for the *good of the service*." In my many talks with English naval officers I have found that, with them, "the good of the service" is invariably the first consideration.

That should be the guiding principle with us.

The remarks about the necessity for a school of pilotage are deserving of consideration. Coast survey duty is the nearest approach to it we have; when the coast survey comes more in touch with the strategic studies of our coasts the essayist's views will eventually be realized, there is little doubt.

The chapter on warrant officers is excellent, as well as that on petty

officers. Seamanship has been languishing in the Navy for some years past, but is not yet quite a lost art. There crop out, from time to time, signs of resuscitation. We must have seamen, and those seamen must be trained and the best of them promoted to petty and warrant officers. To do this properly there should be a gunnery ship. I have seen the experiment tried and know perfectly well of what it is capable. A gunnery ship properly conducted is a species of normal school for petty officers. That we have never taken a hint from the English and French gunnery ships is one of the most striking illustrations of our defective organization. Under our system a gunnery ship, with all its possibilities, is simply hopeless.

All that is said of the blue-jacket meets with my unqualified approval. The trouble is, there is no one to look out for his interests. The most extraordinary thing in the whole of this business is the want of appreciation on the part of somebody, I do not know who, of the importance of the office performed by the captain of a great gun. Just fancy a great line-of-battle ship of the Massachusetts type rushing into battle. The main reliance is placed on her deadly prow and on her two 13-inch guns. If they perform their work the fight is won. But who controls them? The seaman at the wheel and the captain of the gun. If in the supreme hour of trial these are found wanting, the battle may be lost and the honor of the flag tarnished. The commanding officer gives his orders, of course, but the seaman at the wheel, by a spoke or two one way or the other, it may be through nerve or the lack of it, may cause a direct blow and success, or a glancing blow and a lost opportunity. And the commanding officer may give the order when to fire, but if the gun captains be not cool and steady hands and thoroughly trained in the use of the great engines of war they control, then their firing will not be good and the efficiency of the ship will be heavily discounted. We pay millions of dollars for one of these great mobile fortresses; thousands of dollars for each gun, and hundreds of dollars for each charge of ammunition, to say nothing of all the brain work, the educated talent in designing, the skilled labor in constructing and the time consumed in putting all together, and yet the trained intelligence that is to utilize all this in the crucial test of battle is left to mere chance. It is inconceivable. And then consider the possible results. In the one case, victory and the glory of the flag; in the other, defeat and national humiliation.

When the rating of seamen-gunners was first introduced it was intended that they should be trained exclusively for gun captains and have comparatively good pay. But when they came to be assigned to duty as machinists, lamp-lighters, ship's painters and the like, their chief characteristic was lost and their pay was cut down. A seaman-gunner now receives \$11 a month less pay than the captain's cook and \$4 a month less than a bugler. The captain of a 13-inch gun, or, speaking generally, the captain of a great gun, should have the highest pay of any petty officer in the ship. But to entitle him to this he should be carefully educated for the position. I am a thorough believer in education, but I do not believe in misdirected education. If we are to train a man for life on board



ship and for the skilful handling of ships' guns, I do not believe in so shaping his course of training as to fit him for civil life.

These and kindred topics have been discussed a great deal in the service with little or no result. I have come to the deliberate conclusion, therefore, that there is something wrong in our system. The fault lies in our form of naval administration. The head must be sound if the members are to work in harmony.

In an article entitled "Naval Administration," contributed to the Proceedings of the U. S. Naval Institute in 1888 (Vol. XIV., No. 3), I undertook to trace the history of our Navy Department, show its defects and point out the remedy. I have seen no reason since that time to change my views. I quoted President Cleveland as saying: "The conviction is forced upon us with the certainty of mathematical demonstration that before we proceed in the restoration of a Navy we need a thoroughly reorganized Navy Department." These words were true at the time they were written, and they are true to-day. To purify a stream you must begin at the fountain-head.

I do not pretend to say that a reorganization of the Navy Department is the panacea for all naval ailments. You cannot eliminate from human institutions the element of human imperfections. The mentally poor are always with us. But it stands to reason that no scheme of reorganization is worthy of serious consideration that does not include the head of the system to be reorganized.

In an essay containing so much that is good, so much that commends itself to one's approval, I regret to find one recommendation impossible to indorse.

I believe in keeping the marine guard on board ship. The idea that marines are placed on board ship in these days to keep sailors in order I dismiss as utterly unworthy of a moment's consideration. I yield to no one in my high opinion of our seamen. It is my pride that I was brought up among them. I gladly concede all that is claimed for them. As infantrymen on shore, as serving with a field battery, on camp duty, as sentries serving on shore in *any* capacity, in peace and in war, I can testify of my own personal knowledge that our sailors have always done well. It is no compliment to say that in many respects they are far superior to marines.

In the several encampments of the naval brigade of the North Atlantic Station I have often seen blue-jackets posted as sentries and I know that they were faithful in the performance of their duties. They took to the duty naturally, and it seemed quite in accordance with the fitness of things. But in his own element it is quite another matter. To see blue-jackets posted as sentries on board ship would be enough to shock one's sense of military propriety. The idea of a sentry and a soldier cannot be dissociated. It is the sincere regard I have for the sailor that prompts me to enter my protest against the attempt to make him a hybrid soldier. It is not that he would fail in his duty; it is not that he is "not to be trusted." Officers who say so show their training as sea officers to be defective. Let us have no false issues. It is because soldiering is not

his vocation. That he can perform at need the duty of an infantryman is so creditable because it is not his vocation.

The marine guard on board ship is the outward and visible sign of the military character of the environment. It serves to keep alive and foster the military spirit. To take the marine guard from the ship is to deprive it in a great measure of its military aspect. If it is said that it is only for show, the reply is that show, appearances, the "pride, pomp and circumstance of war" go for a great deal in military life. But it is for much more; the marine guard belongs to the fighting force of the ship just as much as the seamen do, and although an infantryman, he can be made a good marine artilleryman. Marine officers are just as much line officers as sea officers are, and have the same adaptability. One of the best signal officers I have ever seen on board ship was a captain of marines. But they preserve withal their distinctively military character. And it is that distinctively military character that gives them their value in the economy of a ship of war.

Take for a single example the case of a call in a foreign port to protect the American consulate. The presence of marines there is a visible sign all foreigners would understand—that the place was under military protection. The distinctive character of the soldier is recognized the world over, and the all but sacred character of a soldier on post is universally respected. Sorry, indeed, would I be to see soldiering made a part of the regular duties of a man-of-war's man. Sorry would I be, speaking in my character as an American citizen not unacquainted with naval affairs, to see the backward movement of withdrawing the marine guards from our ships. Had I ten thousand votes they should all be cast in favor of preserving their present status and increasing their numbers.

Lieutenant H. C. POUNDSTONE, U. S. N.—I don't wish to criticise any suggestion or statement of Lieutenant Fullam, but would like to put myself on record as entirely agreeing with him.

There can be no doubt in the mind of any reasonable man that *ship* efficiency underlies the whole question of the readiness of the fleet for action. This granted, then anything that interferes with or encumbers the effort to make the ship an efficient fighting machine should be got rid of, no matter what reason it has had for existence.

To fight the ship requires men for the guns (with a sufficient number of supernumeraries to supply deficiencies from sick and casualties), for the supply of ammunition, for handling her, and to work her motive power. To maintain any other force on board embarrasses the ship by just that much and gives her much the character of a transport.

It is without the limits of probability that sharpshooters will be required in future naval actions, and believing that the police duty of any ship can be done just as well, perhaps better, by the sailor, I unhesitatingly endorse Lieutenant Fullam's suggestion as to the withdrawal of the marines from ships; for unless they can be used for any and *all* the duties of a man-of-war's man they are not only of little use, but would add to the greater



or less confusion and casualty incident to action, with no corresponding gain. If they are required to do all of a sailor's duties, why not have sailors, pure and simple, with the fighting body homogeneous?

No one denies the good work or admirable record of the United States Marine Corps, but many changes are necessary to conform to modern conditions of battle, and it would seem imperative, in the light of this, to have all fighters and no passengers.

I am heartily in accord with Lieutenant Fullam as to proposed changes in the engine departments of our ships. In small ships one, and in large ships two engineer officers can superintend all that pertains to the care, preservation and manipulation of the motive power, and the machinists are, or can be found, entirely competent to run and repair the plant.

Lieutenant C. H. LAUCHHEIMER, U. S. M. C.—Gentlemen.—I have accepted the invitation of the Board of Control of the U. S. Naval Institute to present an opinion and criticism on the paper entitled "The Organization, Training and Discipline of the Navy Personnel as Viewed from the Ship," by Lieutenant William F. Fullam, U. S. Navy, lest it might appear from a non-compliance with the request that I in any way endorse the statements made by the author. The parts of the paper which refer to the matter of the personnel of corps other than my own I will give but passing notice, and will confine myself mainly to the strictures on my own corps, as it is evident that a discussion of this feature belongs most appropriately to the marine officer.

The paper resolves itself into the one proposition, that the Navy, in order to be efficient, must rid itself of the alleged fungus growth and be a Navy of the line, for the line, and by the line. The marines must be dispensed with because they stand in the way of the enlisted personnel. So long as they remain on board ship the growth of the enlisted men is retarded, and the responsible positions they should fill must remain vacant. In other words, the essayist endeavors to create the impression that his plea is made for the poor neglected enlisted man, sacrificing all personal gain to the general good of the service. Let us see if he is honest. He insists that the petty officer must be trusted and given positions of responsibility which he has never hitherto been allowed to enjoy, and yet in the same breath he makes a strong appeal for more line officers, who, he claims, are needed for the changed condition of things on board ship, such as the separation of guns by bulkheads and turrets, etc.; and finally he makes the statement that the result of an engagement might hang upon *the presence of an officer at a certain gun or torpedo*. Does this look like more responsibility for the petty officers when the author recommends an increase of line officers even so far as to have one at each gun and each torpedo? Why are we training gun captains if the officer is to fire the gun? To show the want of logic in the paper, the author discusses at length the necessity for a decrease in the number of engineer officers on board ship, and recommends in their places petty officers of engineers, who are to have complete charge of the complicated machinery of our new vessels, with all

that the term implies. Now, why should a petty officer of engineers be trusted with the great responsibilities which we all know are now incumbent upon those in charge of the enormous masses of machinery on board our new ships, when a petty officer of the line cannot be trusted even to fire a gun or torpedo? If one or two officers cannot control the supply of ammunition to the guns, how can the petty officer of the engineer's division be expected to control the supply of coal to the boilers, especially when we take into consideration the intricacies of the means of supplying coal in our modern war vessels? I make this reference simply as an illustration of the entire want of logic which seems to pervade this paper. In fact, nowhere throughout the paper is any argument offered in support of the ideas advanced by the author, but instead thereof we are furnished with bare statements and a few perverted facts.

As another illustration of the absolute want of logic in this article, I must refer to the new phrase invented by the essayist and used by him in speaking of officers of all corps other than the line, *i. e.* vested rights, which he ridicules and speaks of in a generally derogatory manner. His climax is reached on page 93, where he says:

"The captain of a ship, and the officers who are educated for the ultimate purpose of command, must study naval organization in its broadest sense; and their competency to decide upon the general features, functions and relations of all departments, in order that all may be formed into an efficient and harmonious whole, cannot be denied. It is for this duty that a line officer exists. If he neglects it, or is not permitted to consider it, who shall take it in hand? Who is more competent, who is more logically the proper man for the work? It is impossible to dodge the inevitable fact that it is the legitimate duty of line officers to exercise general control over the whole subject of naval organization in all departments; they are not meddling when they assume this function; they are not usurping power nor trespassing upon the 'vested rights' of others; they are simply performing a 'vested' duty and the one which is most vital to an efficient Navy. If each corps of the Navy is made independent and permitted to reorganize itself; if questions of rank, titles and pay are to be decided exactly as the several corps may demand, and if certain matters which are of comparatively trivial importance in their bearing upon naval efficiency are to monopolize the attention of Congress, naval reorganization will be a dismal failure."

It has always been recognized in the naval service, which was originally organized in accordance with the Constitution, and which receives its support from Congress, that while different parts thereof have their duties designated by proper authority, the whole constitutes the Navy proper, and it could hardly be expected that Congress or the American people would say that there are no such things as vested rights for an engineer, a paymaster or a marine officer, but that, by intuition, *vested rights* do exist for the *line officer*.

The author states that the few duties now performed by the marine



are shown to be but a personal opinion, clouded by bias, if not by ignorance.

The history of the Marine Corps is one which is well known, not only to officers of the service, but to the American people. Its record is one of which not only its officers, but the people of the country may well feel proud. The author himself dares not attempt to cast a single blemish upon its record, and, in fact, it seems that the excellent record of the corps is the cause of the entire trouble. In other words, the marine is too useful, his record is too good, and therefore he must be taken away and some one else educated to do his duty, and who, if the system succeed, will be nothing more nor less than the marine of to-day. Granting that the *morale* of the enlisted men of the Navy has improved—which supposition is not borne out by the number of records of general and summary courts-martial received at the Department—does the author say that if marines are dispensed with on board ship, sentry duty will not have to be done? I do not believe that even he would make such a statement. Therefore, granting that sentry duty must be done, is it not better that it should be done by a class of men educated for the purpose, and who have done their duty for years to the entire satisfaction of the service and the country? Will a sailor be reported more graciously by a brother sailor than by a marine? If so, my experience has been for nothing. Again, from the experience of line officers with whom I have conversed and who have served on the ships where the sentry duty was performed by sailors, I learn that the system is not a success, and one officer said to me, "I hope it will be my last experience on board ship without a marine guard."

In this connection it would be well to see what is the sentiment in foreign navies towards the marines, for in all questions which affect the Navy we invariably look to the large naval powers abroad to see what they do. In the French service, the second largest naval power in the world, the marines were taken from the ships in the winter of 1870-1 in order to man the defenses of Paris, and were found so useful that, notwithstanding the repeated endeavors of the Minister of Marine to regain them, they have been kept permanently in coast fortifications and on duty in colonial ports. To fill their places it has been found necessary to practically create another corps of marine infantry, and we find in the naval budget, under the head "Specialists," side by side with torpedoists, helmsmen, topmen, etc., the "fusiliers." These men, the fusiliers, before going on board ship, receive special musketry instruction, and afterward man the guns of the secondary battery, form the landing company, perform the guard duty of the ship, and remain permanently together as a whole. They are commanded by an officer who has had special training in musketry; they form from one-sixth to one-eighth of the entire complement of the ship, and they are practically what the marines of this country are.

England, whose navy must ever be her bulwark of protection and defense, and is the finest in equipment and personnel in the world, has afloat in her ships nearly 8000 marines, and her estimate in the coming budget increases the corps by 500 men, making a total of 16,000 marines.

The author, after discussing the value of landing parties and all that this term means, calmly lays down the rule that this subject is a very simple one, and says:

"It is a fact that infantry drill and the guard duties in the Navy require less ability and less study than a hundred other duties that fall to a naval officer. A simple drill-book and a simple guard-manual are needed, that is all. Unnecessary complexity in these matters has been a great bugbear."

The writer calmly claims that an officer-of-the-line of the Navy is enabled to perform all the duties of an officer of artillery and of infantry in a landing force without much trouble and as well as an officer who has spent years in studying and practicing these duties. With all due deference, I think that most people will doubt this statement, and will agree that a marine officer, who is almost without exception constantly in touch with men ashore and afloat, drilling, teaching, training, studying the human nature of the soldier in that best of schools, experience, might, or at least ought to be able to, perform these particular duties a little better than an officer, however intelligent, who has had little or no experience in such matters. The study of a simple drill-book and a simple guard-manual will not teach an officer the many duties that a marine officer performs, as the essayist would discover if he had more than a cursory knowledge of the subject. It is not the fault of the marine officer that he is not given the command of landing parties, although, if the truth be known, though others may be in command, the moving spirit of the organization is most frequently the marine officer.

It is a pity that the essayist did not name at least one or two of the hundred duties of a line officer that need more ability and more study than does the training of an infantry soldier. It used to be said in the Army that "it takes three years to make a man a good infantryman." The Army officers must have been densely ignorant, or else the line officer of the Navy, as pictured by the essayist, must be a prodigy.

The writer speaks of the recent landing drills of the North Atlantic Squadron, in which "the onlooker could not fail to see that the line officer is equal to all military duties, and that the infantry part brings the least strain upon his intellect." The statement that the infantry part brings the least strain upon the intellect of the line officer of the Navy really should be given no serious consideration, for history has shown the importance of the infantryman, the extent of the study necessary to make him a success; and I doubt very much whether even so distinguished an authority as Lieutenant Fullam would be able to throw discredit upon so important a branch of the Government service by a statement which is unworthy of even a casual reader of history.

The great and overshadowing question which lies at the very bottom of the article is: "Shall the marines be withdrawn from the ships? Is the day of their usefulness on board ship past?" I fail to see in the article a single argument which bears out the author in his contention. In fact, he does not endeavor to make any argument, but is satisfied with making statements unsupported by facts, and which, when diagnosed,



whom were standing sentry duty in four watches, while the other half were off duty for the day. This statement is, if true, a very unusual state of affairs. Even if the 67 men were doing the work specified, and the 30 marines were likewise engaged as stated, what more natural than that the question should arise, "What became of the other 203 men—what were they doing?" My experience aboard ship has been to the effect that even though the marines have not hitherto taken part in coaling ship, it is well known that their duties are increased correspondingly with the extra duties devolving upon the sailors at this time, because almost invariably it is the custom to increase the number of sentries whenever ship is being coaled, the opportunities for smuggling liquor being so much greater, and the precautions to be taken correspondingly increased.

The fetich of coaling ship has been used long enough by the author and a few others. 67 men would be considered an abundantly large number in the merchant marine to handle 150 tons of coal in a day. They would be expected to get in each other's way, as they do. Only recently a British man-of-war took in 520 tons of coal in eight hours. On the Pacific coast of the United States, where the merchant seaman is protected by a powerful seaman's union, six men, the entire deck force of a vessel of 2500 tons displacement, have been known to hoist in, wheel forward in barrows and chute into the bunkers 70 tons of coal in six hours, one of the six men attending the steam winch; and this gang was pronounced by the first mate of the vessel to be the slowest and laziest he had ever seen on board ship. I think this practical illustration of what is done in the merchant marine should be a sufficient reply to the oft-repeated and threadbare bugaboo about coaling ship.

The marine on the new ship is even more useful than he was on the old ships, because it is well known that in the new ships, being nothing more or less than floating forts, sail power being dispensed with, and the necessity for going aloft being done away with, the man about deck is to be a useful man and an artillerist. The marine just fills the bill to perfection; by his training he is especially well adapted for his duties on such a ship. The marines have time and again shown their ability at the batteries when they have been thrown into friendly competition with their sailor brothers at target practice, for their training at target practice at shore stations develops in them the necessary qualifications for an expert in the use of a gun that is sighted and fired like a rifle. What a great measure in the interest of efficiency and economy the permanent assignment of marines to the secondary battery would be! The regulation board, hereinbefore mentioned, composed of eminent naval officers, unanimously adopted a regulation so assigning them, but, like other recommendations concerning marines, it was stricken out after leaving their hands.

Surely it is hard that the marine is to have fault found with him because he is trustworthy and efficient. Is the fact that he is trustworthy any reason why other men should not be so? Is it necessary to put a

man on sentry post to trust him? Are marines put in running boats to watch the blue-jacket? Has not the British blue-jacket, with his "loyalty and discipline," grown up in daily contact with the British marine? *There* is a system which has lasted for *more* than a hundred years, and the British naval officer to-day does not find it necessary to try a new system in order to make his men trustworthy, to progress toward perfection, in fine, to make them "equal to the marines." The British workman has been engaged in shaping his material until his light troops are what they are. Foreign naval authorities do not appear to agree with Lieutenant Fullam that men should be equally capable in all branches of ship duty, but it seems to be the general practice to educate men to be specialists.

The seaman can never, from the nature of circumstances, fill the requirements for a trained military force on shore to oppose the military troops in foreign countries when called upon to land from the ship. His duties are most important in his own branch, and he, like the marine, requires special training in the details of his profession. Neither can replace the other, and both are essential to an efficient Navy, each supplementing the other in making a perfect whole. Look at the different circumstances under which they go on board a ship going into commission. The sailors, who have been recruited on receiving ships at different navy-yards to serve for three years, and many of whom have been possibly two or three months in the service, are brought together for the first time on the deck of a new ship. They are assigned to gun divisions and companies, under the officers. They are new to the ship, to each other, and to their officers, and their officers are new to them. They have not been under discipline for some time, some of them never. The officer, who has been for three years on shore duty, or in the Coast Survey, is a trifle out of practice in drilling and commanding men; therefore, it takes some time for all hands to get shaken down to their work, to know each other and to familiarize themselves with their duties. Even then the crowded deck of the ship is no place for instruction in the school of the soldier, or to exercise men at company drill or in battalion manœuvres. Again, the exigencies of the service require frequent changes of sailors from one division to another, which is discouraging to officers and men; for an officer, after he has taken pains to bring his division to a state of efficiency, knows his men and feels himself in touch with them, and they have a mutual liking and respect, and does not relish finding some morning that two or three of his men have been replaced by new ones from another division.

The marine is enlisted at a recruiting station for five years, and immediately goes under training to perfect himself in the details of his profession. When a guard is needed for a ship, only well-drilled soldiers are selected, commanding officers being required to send the best men at their disposal; consequently the marine guard goes to the ship thoroughly trained and disciplined, having been drilled together in the school of the soldier, company and battalion manœuvres, instructed at aiming and sighting guns and target practice; they are accustomed to



almost supernumerary to the complement of a ship, and instructions were laid down that, in 'quartering' the ship's company, stations were to be allotted to the marine detachment of such a nature that, on their landing, the fighting of the ship would not be materially interfered with. The small armaments, numerically speaking, carried by the ships of that period allowed this to be done. At general quarters a large proportion of the marine detachment were to be found performing small-arm exercises on the quarter-deck, others were stationed at unimportant numbers at the guns, more with the object of finding something for them to do than of necessity, for there were more than enough seamen carried to allow all the guns' crews to be formed of them. Contrast, for instance, the *Minotaur's* armament of those days with the present. She had then seventeen 12-ton M. L. guns. She has now the same seventeen guns, with the addition of four 4.7-inch Q. F. guns, eight 3-pounder Q. F. guns, and eleven machine guns; the complement practically remaining the same. Crews, nevertheless, with the attendant ammunition parties, have to be found for the additional guns, and if we went on board this ship at general quarters now the marines would be found, not performing small-arm exercises on the quarter-deck, but occupying as important positions as any other men in the ship; if they were withdrawn for the purpose of being landed, then some portions of the ship's armament would have to remain unmanned. What is true as to the *Minotaur* is perhaps more so as to the modern ships; any one who has had the task of preparing a quarter-bill knows how impossible it is to differentiate in the importance of the stations—every man in the complement has his place, and sometimes, it must be said, more than his place. The withdrawal of any men, marines or seamen, will leave a serious blank somewhere in the fighting stations. If we think of it, we must at once recognize the fact that the marine detachment forms as important a portion of the complement as a similar number of seamen would. Happily this point has not been lost sight of, for whereas in former days knowledge of naval gunnery was almost exclusively confined to the marine artillery, now the light infantry are well trained in their barracks in this respect, and the majority of them, over a certain service, qualify for the rating of trained men. The line of demarcation separating the marine artillery from the light infantry is not so broad as it was; fusion of the two branches has been mooted more than once. No doubt much might be said for this from an economical point of view, but everything must not be sacrificed to economy; if we look upon the marine artilleryman as bearing the same relation to the light infantryman as the seaman gunner does to the trained man, there is much to be said against the idea. The difference in the officers' training has to be considered, although, happily for the corps, as good gunnery officers are to be found amongst the infantry as amongst the artillery. Satisfactory as the marines of both bodies now are, it is to be hoped that under no circumstances will their sea training and experience be allowed to be less than it has been. Unfortunately, danger of this—at any rate, as affecting a large body of men—is to be feared, for owing to the dearth

of seamen which has characterized the service during the past few years, the marines forming the complements of the harbor ships have been much increased. It follows, therefore, that unless care is exercised, the sea-going experience of these men will be lessened. In the last few years a strong battalion of marines have been sent annually to Aldershot, and have, to the credit of the corps, called forth much praise for their steadiness and drill; this movement must be jealously watched by naval officers, insomuch that it is liable to divert the attention of the officers and men from the reason of their being and calling, which should be sailors first and soldiers afterwards.

"The Navy is proud of the marines, and therefore it is satisfactory to find that their numbers are almost up to the prospective requirements of the fleet. 15,363 is the strength estimated for this year, and there is no lack of recruits; it is calculated that 16,700 will be enough to form the complements of the ships built and building. A system of entering men for a period of five years to build up a reserve—which in the case of seamen and stokers might be practicable, for these latter on entering the reserve have a trade to fall back upon—cannot be applied to the marines, for the reason that to do so would be to add to the numbers of the unemployed and thus to intensify the difficulties of the Army Reserve. There is nothing for it but to keep the strength of the corps up to the limit necessary for the requirements of the fleet, trusting to the small reserve to be obtained from the pensioners' list. Unless, indeed, their strength is raised to a point, not only sufficient for the fleet, but sufficient also to provide garrisons or part garrisons for some selected coaling stations. The opinion is no doubt held by many that, inasmuch as the marines so employed would form the garrison of the station, they could not be withdrawn for purposes afloat. Granted, at the beginning of the war; but it is allowable to think that, provided the command of the sea has been obtained, part of the garrisons could be withdrawn, and it is not till then that their services would be required afloat. There is another point in favor of this plan: the opinion is held by many officers that expeditionary raids of comparatively small forces will form a prominent feature in future naval operations; now for such services as this the marines, by their duplex character, are, of all our fighting forces, the most suitable. The admiral commanding on a foreign station would be very delighted to have, say, 2000 marines at hand for such a purpose. It may also be objected that the sailor qualities of the force would deteriorate; but this could be guarded against by changing, say once a year, the detachments of the ships on the station with men taken from the garrisons. Whatever may be said on the foregoing plan for increasing the numbers of the marines, at the risk of repetition it must be again stated that the main point to be borne in mind in dealing with this corps is that the detachment borne in a ship forms an integral and inseparable portion of the combatant branch of the crew. The proportion of marines borne to the other combatant branches varies from one-fourth to one-fifth."





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U. S. NAVAL INSTITUTE, ANNAPOLIS, MD.

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NAVAL WAR COLLEGE.

CLOSING ADDRESS, SESSION OF 1895.

By CAPTAIN H. C. TAYLOR, U. S. Navy,  
*President of Naval War College.*

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*Gentlemen:*

We are now about to close the session of 1895 at the Naval War College. The College has not been long established, and during these, its early years, our sessions have been avowedly tentative in their nature. It has been our wish to discover, through actual experiment, whether the Navy desired these methods, whether it felt in itself any disposition toward the study of war. I have never doubted that the Navy would know, better than any one could tell it, what its professional needs were in any special case, if its attention could once be seriously drawn in that direction. An ancient maxim says that when a man has reached the age of forty he is either his own best doctor or a fool. Similarly it may be announced as probable that an organized system such as the Navy, with a century of growth and experience to form its opinions and generate its intuitions, will have a clearer knowledge of what is good for it than can any individual suggestor, whether he be himself within or without the ranks of the naval profession. To insure this clear knowledge and intuitive perception on the part of the naval organization, it is of course a prime necessity that its attention, attracted in turn as it is to the many new and strange things of modern times, should be concentrated for a time at least upon this somewhat neglected art of war. Once thus concentrated, we may count upon a worthy decision, representing as it does a consensus of intelligent minds, able to judge and



faithful in judging; lending its weight to that maxim of the politicians that "Every one knows more than any one."

The attitude of the College toward this matter is therefore that of one who, having submitted certain questions to a court and produced varied evidence for both sides, awaits with patience the decision of the judge. In this case the Navy is the judge, and will in time render a just verdict; but the College, though it will await the decision with patience, does not profess indifference as to the result, but on the contrary announces itself as an earnest believer in the study of warfare as immediately and critically necessary to ensure the credit of the Navy and the reputation of the Republic in the wars that are to come. We refer to the history of nations and of their armies and navies for absolute proof that this critical need exists. Their records show convincingly that the neglect of the art of war renders useless or destroys the bravest troops, the best equipped fleets. No one claims that the Germans who conquered France in 1870 were a different race from those Germans who were swept from the map of Europe as a military factor in the early years of the century, and by those same Frenchmen or their fathers. Clausewitz, and after him, Moltke, perceived that earnest study of warfare, laborious preparation for war, were the natural solutions of this problem, the main factors of success in this trade of war, as in all trades. They undertook the task bravely and patiently. Much patience was needed, we know. The remnants of a feudal system with the ghost of an old-time chivalry were banded together against them. It was rank heresy, their opponents claimed, to say that there was anything in war but bravery and loyalty, especially anything so lowering as work and study—study of their own hills and rivers, of the territory of possible enemies, of their war resources, and finally of the history of former campaigns. War was represented in their minds by their good swords, their steeds, their own valor and fidelity. This was all—there was nothing more. So away with pedants and their dusty histories and laborious preparation! The new school of officers could, however, point to the then recent annihilation of the Prussian armies by the brilliant Corsican, and to this there was no answer ready; and so the new ideas prevailed, and were consummated after a half-century at Königgratz and Sedan.

We of the present day, looking back as from a height upon the century now closing, so full of impressive military lessons, possess an advantage that cannot be overestimated, and that should not, and I believe will not, be neglected by our nation. We cannot fail to recognize in the great example set by Prussia the overwhelming weight of study and thought in war; though that country delayed until it was driven into this system by the menace of speedy effacement from the map of Europe. The question for us is whether we shall also wait until war having come, some national humiliation teaches us the bitter lesson that Prussia learned in loss and sorrow. It is not a question now of a large or small Navy, but how we will some day use whatever force may be placed in our hands. Eight of our ships well handled and bravely fought, but beaten by twelve of an enemy—this will bring no shame to our people; but should the day come when twelve of ours, through lack of officers trained for war, are defeated by eight of an enemy, then will a blow have been struck at our national pride, and the bonds of sentiment which alone hold together the different portions of our country will be that much weakened and more likely to break under pressure when the disrupting forces, to which all nations are at times liable, shall be exerted to divide the continent into several distinct nations. We can endure defeat if discreditable no better than other races. What they may dread in loss of territory given up to their conquerors, we have to fear in the shape of a weakening national sentiment tending some day to disintegration of the body politic.

As to the material and men provided, no thinking man among naval officers would advocate great armies and navies for our Republic. The force provided, the ships, the weapons, and the personnel should undoubtedly be of small though reasonable size, but there is an eternal fitness of things which must be considered. There goes to the making of a great nation, or a complete one even if not great, certain elements which enter in due proportion into its composition, and no one of them can be omitted or slighted without marring the appearance and the strength of the whole. There must be so much commerce and money-getting, so much of governmental protection, so much of legislation, of judiciary, of revenue, of expenditure. With these and many other elements there must be



a proper proportion of military force for protection against enemies, for strengthening the other arms of the government, and in addition to stand as a type and embodiment of that spirit of national pride and aggressiveness which, although decried by some, nevertheless exists as an inextinguishable trait in individuals and aggregations of the human race. To preserve this due proportion of the elements of a nation its leaders should strive; and if 25,000 troops and 8,000 seamen was a fitting peace establishment a generation ago, and if since then the nation has passed from infancy to youth, or from youth to prime, and has gone forward enormously, not alone in commerce and manufacture, in railroads and telegraphs, but in a certain elevation and expansion in the spirit of the race; then let us not hesitate to increase the military force afloat and ashore to such an extent that its relation may be a true one to the rest of the body politic and that the national edifice may be strong and symmetrical. My object is to impress the fact upon all that hear me, that armies and navies exist not alone for war, though war is their supreme function, but in order to make round and complete the national life and to fulfill one of the structural requirements of the political edifice. We know not why this should be one of its requirements, but we do know that the fact exists. The records of history supply evidence of this; nor is there an exception to be noted in all time. Nations that are over-warlike and too little commercial fade and weaken, and if they do not correct the defect they soon pass away. Similarly nations which make a god of their commerce and money-getting and neglect the military spirit, pass likewise from among the group of competing nations. All the elements must be in proportion in order to ensure successful development and healthy life. I reiterate that this is not only because armies fight battles and win campaigns—that is, I confess, their most important occupation—but they exist primarily because needed as a component part of the organism which when completely developed is called a nation. This organism must clothe itself and feed itself, must in one way or another govern itself, and must by the laws of its existence sometimes engage in wars. This being acknowledged—and it is but a matter of history we are now presenting—it is much to our country's interest that our Army and Navy should undergo a slow but steady

increase in its force, and that this force should keep step as far as possible with the expansion of the nation, its spiritual as well as its material expansion. Nor need we fear that the discernment of the American race will fail in this instance to recognize the instinctive demands of its national life and to require of its government a reasonable increase of its military force afloat and ashore. Here the War College is peculiarly interested. This expansion of our military forces must carry with it all the necessary accompaniments and accessories of a military development; lacking any of them, the attempted step upward may be a stumble, and the resulting fall delay our onward progress upon the stairway of nations, and perhaps bar it forever.

In this material military expansion, the essential point is that the people who are to handle and control the increased force should understand the needs of their profession. There are many of us in the navies of to-day who, having known no great naval wars in our own time, nor in the generation immediately preceding us, fail to appreciate the urgent need of the study of war in all its phases, and we feel, and justly so, that we are expert in our calling as it is at present known. We say very truly that we have sailed ships, fired guns and commanded men, that we know how to do these things well and that there is nothing else of grave import in the art of war. I am told that in a greater or less degree this holds good of the officers in many of the modern armies of to-day. This was not always so. There was a time when, although the world had not advanced so far in what it calls civilization and enlightenment, men of intelligence recognized the existence of the art of war. In the old days, young gentlemen of good families, who were destined for the higher places of the world, after they had learned the use of the sword and lance, the control of a horse, and had studied some of Caesar's campaigns, were sent to "the wars," there to gain an experience that was, with reason, regarded as a necessity for youths upon whom were in time to devolve the duties of leadership and the conduct of campaigns. They profited by this experience in varying degree; some learned to command their men and to care for their horses; others, of higher intelligence, scanning attentively the fields of conflict, gained some expertness in tactical dispositions and some acquaintance with the principles of battle formations; while



a few rare minds, penetrating the confusion of marches and skirmishes, divined the plans of great captains and recognized the far-reaching effects of strategic combinations. But to all there came some measure of that knowledge which only practice can give, and from their minds surely faded those dreams of war which we dream only in profound peace. Those days have passed. Fighting as a profession, except to defend one's country, has come to be thought more or less immoral; nor are there always convenient wars to serve as schools for youths of military inclinations. Yet wars, alas! have not altogether ceased, and we must still learn something of warfare or submit sooner or later to the nation's humiliation.

I fear to have wearied your patience. I do not think that these, my foregoing remarks, are needed to convince your minds, but it will have done no harm to recite in their proper sequence the various circumstances which go to make the study of the art of war proper for those whose profession is that of arms. This being conceded, let us consider whether here at this school of war we are following the methods most likely to attain this desired knowledge.

The system followed is known to you. Its idea is to place officers of experience in such an environment, mental and professional, as shall make it easy and natural for them to bring the powers of their minds and the wealth of their experience to bear upon questions of war, and then to await what seems to be the natural and inevitable result, namely, that those officers will become engrossed in this most fitting professional work and thus ensure valuable suggestions as to naval warfare, and a willing study of the art through extensive reading carried on here and after leaving the College, and a freshened interest and quickened apprehension of the lectures delivered during the session. It is the governing principle of the system to encourage the creative faculty in the minds of the officers in matters concerning warfare, and to dispel that passive condition of receptivity which, as I had occasion to say last year in the closing address, is to be expected in a profession of arms which, at the end of a long peace of thirty years, has become much affected in its reasoning processes by an established routine, long-continued and unbroken.

The war problems have been continued and again excite keen

interest. These problems and the strategic war games develop high professional qualities, but it was observed during last session that the development was principally of the deliberative qualities of the mind. There were occasions in the strategic war games when, after days of preliminary planning, officers, confronted during the game with some unexpected development of the enemy's force, demurred at being obliged in a few minutes to readjust their plans to meet the emergency. It was to prevent that deliberative quality, in itself so valuable, from being carried to excess that there has been introduced in this session the consideration of naval tactical situations. These situations, to which we gave much attention during the first half of this session, and which as you know were based as to their methods upon the tactical situations placed before the German army officers by Von Moltke and others, have, I believe, succeeded in gaining your approval, and I wish to record my opinion of them as a most effective means of developing in our minds a thorough apprehension of the art of war. One of the many defects for which a long peace is responsible is this over-deliberation, this lack of readiness to attack the problems of war at first sight, and it can only be dispelled, I believe, by frequently recurring presentation of these tactical problems to the naval mind. It will give us pleasure at the College, as we prosecute this branch of work, to send from time to time to all officers interested, such situations as seem most worthy and likely to excite professional interest.

Of the War Charts and Defense Plans nothing new need be said. The great value of this work has been previously shown and is confirmed by the present session, and I need not urge further upon your attention their importance in case of sudden war. This consideration is outside of their value as an exercise for the mind in the study of war; for this purpose they were undertaken and will be carried on, but it is not to be denied that their intrinsic value in case of war is very great, for we will then have but few days or weeks allowed us for preparation. These charts will represent years in their construction; and, when placed in the hands of an admiral and his staff already overburdened with the hurry and responsibility of sudden emergency, will be welcomed most heartily as a valuable accessory in the campaign. They need not hamper nor retard a com-



mander-in-chief's plans, for it will be a simple matter, if that officer does not approve of them, to throw them to one side and invent his own; but it will often be the case that the time will not allow the formulating of new plans, and that these war charts, the result of patient work and intelligent study, may be of inestimable value to our fleet in a moment of crisis.

Among other exercises the single-ship game has been improved, while the tactical game has advanced far towards that effectiveness which the College finally expects it to attain. The strategic game continues its hold upon the attention and teaches us many lessons concerning naval warfare on our coast and in the Caribbean Sea.

The use of the launches has not been as full and effective as the College had hoped. The President of the College wishes, however, to record his unaltered conviction that much of great service to us will be learned from them. Last year we undertook some ramming experiments; this year we have tried on a few occasions to manœuvre to keep the enemy under our most effective fire. I desire to quote in this connection from Admiral Ito, who prepared himself and his captains before his successful battle, by exercises with launches.

"I then equipped," he says, "the steam launches of the various men-of-war in such a way as to ensure them against severe damage in case of collision, and then divided them into two parties, imaginary squadrons, and appointed the two senior officers as the commander of each party respectively, and with them then we practiced sham fighting. This form of drill is very apt to become half a pleasure, and as a matter of fact in a very short time every boat in the sham squadrons began to evince an inclination to try the ram, as they were all well protected against damage in case of collision. Seeing this, I called a meeting of the commanders of all the boats and cautioned them against any such child's play, pointing out to them that all the vessels we were commanding were not ironclads and were therefore not suited for ramming. We then set about training so as to avoid any mistakes of actual collision. I ordered all to drill as if they were engaged in actual combat. After this the tone of their tactics became greatly improved, and all began to manœuvre carefully with a view to avoiding running into each other. This drill was continued until July 23d, when we re-

ceived an order to proceed to Chemulpo, and moved accordingly."

It is left to speak of the lectures, but time will not permit me to mention the many able officers who have addressed us. You will justify me, however, in making an exception of Captain Mahan, from whom we have had two series upon strategy. You have enjoyed with me the power of his mind, the clearness of his military and naval ideas, and the polished directness of his literary style. I need not dwell upon the work of this distinguished officer. I know that I speak for you as well as myself in saying that his lectures and books have poured a flood of light upon the great problems with which we have striven during the last five months. It will be difficult to go wrong in professional questions while we are guided by his wise advice and instruction.

These, gentlemen, have been, in brief, the methods which we have followed in endeavoring to promote the study of the art of war, and in closing I can only repeat to you my words of last year:

"What shall we say, then, in summing up the results of the course? What do *you* say?—for it is not so much what the College says, or what its President may think in his hopeful moments, that is to weigh most heavily in the future. It is what you shall say, officers most of you of long and varied naval experience, that is to constitute the most potent factor in the College future. It is the news that you carry back with you to your ships and stations which is to influence the opinions of our comrades throughout the service and cause them to think and speak for or against the continuance of the College. It must be finally for the Navy to decide whether it wants a school of war or not. If a large majority of the officers wish it and express that opinion strongly, I do not doubt that it will be continued. And on the other hand, if the Navy does not want it, let us not spend our strength in useless striving to give the Navy what the Navy does not want. Only, first of all, let officers know what this thing is that they are to approve or reject. Let them understand what this school of warfare is, what its methods, what its aims, and this they will best learn from the officers present."

I ask you then to speak in no uncertain voice of the College



work. Let there be no indifference, let it be strongly blamed or heartily praised. Believe me, gentlemen, if it be not thoroughly worthy it should be quickly condemned and done away with; but if on the other hand it be the very good thing that some of us believe, and critically important to us and the generation of seamen that is to follow us, then I beg of you to speak boldly and plainly, that we may not falter in the work that is before us.

## PROFESSIONAL NOTES.

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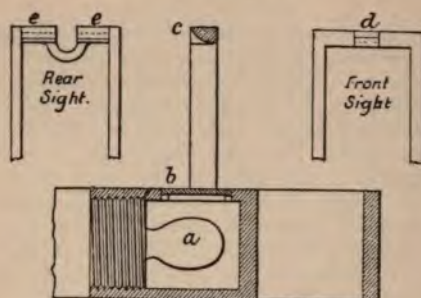
### SIGHTS FOR ORDNANCE.

[ENGINEERING.]

During recent years immense advances have been made in the construction of rifled ordnance, and even more markedly in the manufacture of powders for the same. The much-abused cordite has given wonderful results as to uniformity, and it is related on good authority that on one occasion three successive 100-lb. shells were sent through the same hole at a range of 1000 yards. This, no doubt, was to a certain extent a fluke, but is, nevertheless, an excellent testimony to the ability of the gun crew and the quality of the material. The construction of gun sights has not, however, altogether kept pace with the advances in other directions, and the old simple notch sight is still in general use, and, in spite of its crudeness, the results obtained are astonishingly good. Nevertheless it has long been recognized that a telescopic sight, if so constructed as to stand the hard usage to which it must necessarily be subjected in actual warfare, would have great advantages. The principal difficulty has been to construct a telescope sight in such a manner that it can be left on the gun during the firing, which has many obvious advantages. The fittings must accordingly be strong enough to withstand without injury the jerk arising from the recoil. A telescopic sight has been introduced by Captain Grenfell, of 39 Victoria Street, Westminster, and has successfully undergone severe trials in France. It consists of an ordinary theodolite telescope mounted on a curved rack, passing through a sleeve rigidly secured to the gun. This rack is of hardened steel and of channel section, and has accordingly great rigidity for its weight. The most severe tests of its rigidity were made by running the telescope up to its highest point, in which position the jerk of recoil will, of course, bring the most severe bending strains on the rack, and firing the gun with full charges. This ordeal was successfully passed through. In dull weather the telescope is of little use, as light is lacking, and hence in all cases an ordinary sight must be fitted as a standby. In this case the ordinary sight consists of a set of cross-wires fixed at one side of the telescope, near its object-glass, whilst near the eyepiece an iris diaphragm is fitted, and the sighting is effected by placing the eye to the orifice in the diaphragm and aligning the cross-wires on the mark. It should be stated that in no case is the line of sight parallel to the bore of the gun. This is owing to the fact that the shots from a rifled gun have a lateral drift, allowance for which is made by tilting the line of sight an equal amount in the other direction. Another difficulty to be overcome in the matter of sighting is the reading of the range scales, the divisions towards the upper end of the scale being exceedingly minute. An open reading scale has obviously great



advantages, and to secure this Captain Grenfell has adopted the ingenious plan of engraving the scale on a strip of phosphor bronze some 10 feet long. This strip is coiled round a couple of rollers, connected by gearing with the telescope rack. One of these rollers is spring mounted, so that any slack between the two rollers is automatically taken up. In this way the dimensions of the scale are greatly magnified, and the ranges can be engraved on it in plain figures. The necessary horizontal deflection for wind allowance is obtained by means of a tangent motion by which the telescope can be rotated in a horizontal plane. In the French trials this sight gave excellent results, although the gun crew had had no previous training in its use.



At night all the usual methods of sighting become difficult, and many attempts have been made to simplify matters, such as by touching the front sight by luminous paint, throwing the light of a lamp on it, etc., but the method now generally adopted in the navies of the world is due to Captain Grenfell, and is shown diagrammatically in the figure. The device consists of two fittings, one of which can be secured to the front and the other to the rear sight. Each of these fittings is arranged to receive a small incandescent lamp *a*, the light from which is reflected through a window at *b*, which is of red glass in the case of the rear sight, and of white glass in that of the front sight. This light striking on a curved surface at *c*, which is polished and of a non-corrodible metal, is seen by No. 1 of the gun as a bright horizontal line. The curved polished surface, in the case of the front sight, is confined to the central part of the stirrup as shown on the right at *d*, whilst in the case of the rear sight a notch is cut in the stirrup through which the front sight can be seen, whilst on each side the light of the lamp is reflected as a red horizontal line from the two polished surfaces *e, e*. The appearance in aiming is, therefore, a white horizontal line between two red ones. When the three are in one straight line and at the same time the middle line is bisected by the mark, the gun is truly aligned, both for direction and elevation. A switchboard connects the lamps to the source of current. Mounted on this switchboard are two rheostats, by means of which the intensity of the light is controlled. By operating one of these, the relative brightness of the two sights can be adjusted to each other. This done, the second rheostat is used to vary the brightness of the two lamps uniformly, until both the sights and the object aimed at can be clearly seen at the same time. In a still more recent form of this

sight Captain Grenfell has added a third switch, by which a small hand lamp can be coupled up with the board. This lamp is used for reading the range scale.

### DEVICE FOR MINIMIZING THE EFFECTS OF COLLISIONS AT SEA.

[EXTRACT OF ADDRESS DELIVERED AT GENERAL CHAMBER OF COMMERCE, HONGKONG.]

By REAR ADMIRAL S. MAKAROFF, Imperial Russian Navy.

*Mr. McConachie and Gentlemen.*—I need not tell you that collisions are very frequent in these days. I have no statistics, but every one reading one of the big morning newspapers finds there almost every day some information about collisions at sea and their fatal consequences. In some cases the newspapers give different details; but more often the report is very brief and simply states that such and such a ship went to the bottom and so many lives were lost. Every one of us is so much accustomed to read such information that we do not ask ourselves whether it is really unavoidable that, after the collision, one ship or both of them should go to the bottom. It is taken for granted that from time to time ships collide and sink, and I believe this sort of information produces less impression upon us than some trifling political news. From time to time a court of inquiry or court-martial investigates the details of the collision, but it is certain that the court will study chiefly the question as to who is responsible for the collision, and very little notice is generally taken of the reason why, after collision, a ship goes to the bottom. Shipbuilders tell us that ships are divided by the water-tight bulkheads, and that the buoyancy is sufficient to keep a vessel afloat should one of the compartments be filled with water. Generally, when collisions occur there is nobody to accurately record the details, and as a rule it is taken for granted that the collision took place at the bulkhead, and for this reason two big compartments were filled with water. Maybe it will also be suggested that one of the bulkheads could not stand such an immense pressure and gave way at the critical moment. Formerly collisions were not so fatal, as sailing ships, which are usually constructed with a fiddle bow, have bowsprit and so much rigging in front that the effect of a collision is of course minimized. It is also necessary to mention that in the old days the speed of ships was very much less than it is now, and that the ships were mostly of wood, which resists more effectively than the thin plates of steel used at the present day. A fiddle bow usually damaged only the upper part of the ship, and before the water-line could be reached the force of the blow had spent itself. The ships of to-day travel at a high rate of speed; they have great displacement, and their vertical bow is so strong and so sharp that the moment collision takes place the skin of the ship is penetrated from the gunwale to the water-line, and an immense rush of water into the vessel is the result. Let us go into the details of the collision so that we can ascertain whether any remedies can be applied to lessen the danger. I shall try to be as brief as possible, but in order that you should better understand, let us look at the matter from every point of view. The first and best



ship, as shown in figure 1. Many little ribs and stays inside ought to give enough strength to the skin to enable it to resist the force of the waves. The space between the false shell and the nose of the ship ought to be filled with some soft, fibrous substance (not powder). This substance is intended to play the rôle of a cushion and the shell will play the rôle of a pillow-case. After collision the false nose will present the appearance as shown in figure 3. The ship's nose will not be damaged, and as generally there is no cargo in the fore compartment of the ship in front of the collision bulkhead, it will be the work of a few hours to unfasten the bolts and remove the smashed false nose in order that the ship may continue her voyage as if nothing had happened. I believe that it is necessary to carry on experiments on a large scale in order to find out which is the best way of constructing the false nose

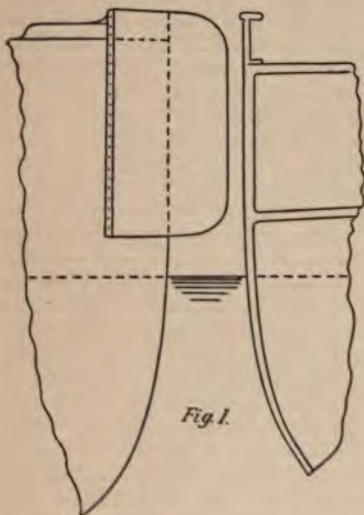


Fig. 1.

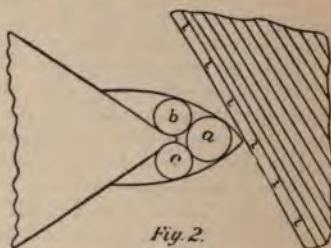


Fig. 2.

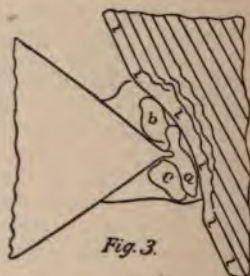


Fig. 3.

of the ship. The cost of these experiments will amount to only a trifling percentage of the loss which is being continually caused by collisions. Let the best engineers work out their plans and submit them to experts for examination. After this a general law might be passed making it compulsory for every ship to be provided with a false nose. Unfortunately in this matter everybody is interested in a general manner, but nobody in particular. Insurance companies prefer to be liberal, and they do not interfere much with the particulars of the building of a ship. They are obliged for a certain percentage to guarantee any risk. If one insurance company insists upon shipowners providing ships with a false nose, then surely the number of the company's clients will diminish, and that will be followed by a diminution of the company's income. Now should one shipowner put a false nose on his ships he would lose, because the false nose would weigh about two tons and cost about £200, and for this reason his ships would be dearer than the ships of his competitors and carry less cargo. The reasons mentioned before interfere very much

with the furtherance of this improvement. Only public opinion can give an effective incentive to the matter, and really if by subscriptions a fund can be raised and given to the Board of Trade or to any institution which will carry on the necessary experiments, then progress is bound to follow. We are not bound to decide the question in a moment, but every one should be reminded that the loss of property from collision is immense, and that almost every day many lives are lost, owing to the absence of any means to minimize the effect of collision at sea.

### IMPROVEMENT IN WAR MATERIAL.

Reviewing the development of war material during the year 1895 the "Engineer" says: "The efficiency of quick-fire depends on the use of smokeless powder, and we may congratulate ourselves that while cordite has given us much trouble in manufacture, the finished article as issued for service has so far proved itself thoroughly stable and safe under the most trying conditions, while it has given excellent ballistic results; in fact, to say that it has established its character as thoroughly, probably more thoroughly than any other smokeless powder, is hardly to do justice to it. On the continent smokeless powders, chiefly based, like cordite, on the combination of nitro-glycerine and cotton, are used, but in the United States, strange to say, so great is the distrust of such powders that nothing better than a semi-smokeless powder of unsatisfactory behavior has been allowed to be used on board ship. On the other hand, the U. S. Navy have been forward to adopt high explosive bursting charges for their shells; recent experiments, however, instituted owing to reports from the seat of the Chinese and Japanese war, showed that powder produced greater effect than wet gun-cotton, and it is anticipated that powder will be reverted to in America.

"Passing on to armor, we find the United States, far from lagging behind, is here in the very front of the race of progress. In the United States a really good nickel treated plate will defeat a Holtz 6-in. projectile. Till our treated plates do the same we are apparently left behind. Then, while we seldom test really thick treated plates, the United States authorities do so and have achieved most striking success with them, especially with what are called 'double forged' plates made by Carnegie. Double forging is the natural remedy for crystallization and weakness produced in very thick plates by the Harvey process, but double forging is untried in this country. At length, however, we are glad to hear that our armor-plate manufacturers are alive to what has been done abroad and are making efforts to push forward. At the Atlas Works (Brown's) nickel steel experimental plates are in course of manufacture, which will be ready for trial in a month. One of them has been forced after cementation by a process which is doubtless very similar to the re forging carried out in the United States, though taken up some time since—before the American results were known here. Messrs. Vickers are also alive to the desirability of developing nickel steel armor, so that we may shortly hope to see good results. While hitherto neglecting nickel in vertical armor, we have happily succeeded in making thin nickel steel plates for decks and structure of ships with peculiar properties, and consider that in them we have a strong element embodied in construction.



"Passing on to shot, even the excellent Carpenter projectiles of large caliber, made in America, appear now to have been beaten by those known as the Wheeler-Stirling make. We know of no achievements in this country to compare with what these projectiles have done. With ever-increasing velocities we might have expected to have had to record bursts of guns during the year. This has not been the case either in England or on the continent. The smokeless powders lend themselves to the achievement of very high velocities combined with a low maximum pressure.

"It can hardly be said that the year has shown good results for the very small-bore rifles adopted by almost all military powers. Some trials on carcasses showed that singularly little harm was done in perforating flesh, but it was explained that in living bodies the inelastic moisture present was violently thrown outward and enormous holes made. This was illustrated in lecture experiments with moist clay and the like. This was too readily accepted; suspicion should have been aroused by the fact that wild animals grazing did not always find out when they were hit; and still more direct evidence was afforded us when a collier, shot through the thigh in a riot, walked about for an hour or two fancying that he felt something, but not troubling much about it. Now evidence has poured in from opposite quarters of the world to the effect that the small bore is singularly deficient in stopping power. It might be said, indeed, to have the opposite effect, for a retreating Chinese is thought to have had his pace rather accelerated as a rule when struck by a Japanese small-bore bullet. Medical reports from England, the continent and America show that the wounds made both through flesh and bone give generally remarkably little trouble and heal with great rapidity. Our troops recently sent to Ashanti have been armed with the old Martini carbine of 0.45-inch bore, nor can we wonder. Savages who have not had the advantage of hearing the lecturer prove the effect of the bullets to be so terrible, would, we fear, take little or no notice of bullet wounds made by the 0.303-inch bore, unless they struck in a really vital place, such as the brain or heart, and these organs are perhaps not specially large in savages. Seriously, something will have to be done about the small-bore bullet; perhaps the partial removal of nickel covering may cause setting up of the bullet to a reasonable size on impact. If this is contrary to the Geneva Convention, might it not be laid down that a civilized soldier must retire from action after a certain number of hits, say two or three? For it appears that even this number have not always caused serious inconvenience at the time."

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## MODERN PROJECTILES, BY V. G.

[LE YACHT.]

Every warship being on the whole intended to fire projectiles and, as a necessary consequence, to receive some, it may prove interesting, in view of the numerous and heated debates raised through the introduction of new types of vessels in the European navies (not excepting the United States), to examine which are the kind of projectiles more likely to be adopted and their probable effects. Considering, moreover, that a vessel

has to contend against guns of a superior design to those it was expected to face, a gun requiring relatively little expense for improvements compared with a ship, it may be equally interesting to say a few words in regard to the progress that the near future has in store in the way of projectiles.

At the present time the naval ordnance possesses two types—armor-piercing shells and shells with high explosive charges.

The armor-piercing shell, as its name indicates, is intended to penetrate the heavy armor plates of a vessel and eventually to injure her vitals. In theory there does not exist an armor plate capable of resisting the perforating energy of a high-power armor-piercing shell, but in practice its efficiency is doubted by the most competent judges of ordnance. If the projectile strikes the enemy's ship above the protective deck it goes right through the light upper works without doing much damage, for its powder charge is, in fact, feeble. The bursting of the shell is produced exclusively by the impact of the projectile, and there is very little probability of an explosion resulting from contact with sheet-iron or even light plates. Were it even to occur, the damage would be far less than that caused by a shell charged with a high explosive, however small.

For an armor-piercing shell to produce serious damage it must strike the thick part of the armor-belt and tear it asunder so as to cause a large opening for the rushing water, or else going clear through, burst in the interior of the vessel. Now the target presented by a belt hardly rising 0.60m. to 0.70m. above the water-line, and constantly screened by the crests of the waves, is extremely small. If we reflect, moreover, that an armor to be seriously damaged must be hit at a favorable angle, and that the firing of heavy caliber guns is relatively slow, we can easily understand that the effects of armor-piercing projectiles are rather uncertain. The common shell is now-a-days far more to be dreaded, for it is not now as formerly by its mass or its broken pieces that it acts, but by the destructive power of the gun-cotton, nitro-gelatine or melinite with which it is charged. These shells, in fact, are real torpedoes fired at a greater distance and with far more accuracy than the automobile torpedo. The charge of these flying torpedoes is much smaller than that of submarine torpedoes, although certain heavy caliber shells contain the same charges as the Whitehead, but on the other hand rapid-fire guns can pour into the enemy's vessel a perfect hail of missiles in a comparatively short space of time.

The ideal in this class of projectiles would naturally be to carry the heaviest possible weight of metal in order to produce an explosion in the interior of the vessel.

Fortunately, up to the present at least, it has been found impossible to fire this class of projectiles against a plate several centimeters thick without its exploding on impact on the outside. In the latter case the results are of little consequence; on the other hand the effects are terrific when the projectile explodes in the interior after going through the hull when the latter is only formed of thin plates.

Experiments made in France on the Belligueuse and at the Gâvres Proving Grounds, as well as in England on the Resistance, have demonstrated the above facts beyond a doubt.

Everything in proximity to the explosion is completely wrecked, thousands of pieces of shell flying in all directions with incalculable force



and crashing through decks and partitions alike. When the explosion takes place above the protective deck the latter is torn open, and the flying debris, forming so many projectiles in turn, demolishes everything below. In addition to these mechanical effects, the nitrous vapors and the oxide of carbon generated render the air absolutely unfit for breathing during a considerable space of time.

The shells are not only dangerous when bursting in the interior of the vessel; when falling in close proximity to the ship they explode under water by contact with the hull, producing the same effects as the ordinary torpedo. Experiments made on the *Provence* have completely proven this fact. In case of war, shells with explosive charges will be almost exclusively used, first on account of their tremendous destructive power, and then because the unprotected superstructures of most of the warships now afloat form a target far more easily reached than their thick armor. Thus it is that the ordnance men of all the European navies are hard at work improving them. The problem is not very easy of solution. The qualities of the high explosive shell seem to antagonize, so to say, one another. The heavier the charge and the thinner the casing the greater the liability of the shell to burst at the slightest shock.

The Americans first conceived the idea of firing torpedoes against the enemy's vessel through the air. Not having at command an explosive sufficiently reliable to withstand the shock of a gun firing a powder charge, they tried pneumatic guns. In order to make the experiments more conclusive they did not hesitate to build a vessel of 2500 tons—the *Vesuvius*—which carried three pneumatic guns 30 meters long. The results were not commensurable with the sacrifices made. The range of the guns was too small. The necessity of training the latter by means of the vessel itself deprived the firing of anything like accuracy. Finally, the sheet-iron tubes protruding upward more than ten meters would, in action, have been disabled in a very short time. The trials of the *Vesuvius* put, for the time being, an end to pneumatic guns in the United States. Their ordnance men adopted the ideas of their European colleagues and sought to utilize the ordinary gun in firing projectiles containing the highest explosive charges and capable of piercing without bursting, the greatest metal thickness possible.

Owing to the secrecy with which the different governments jealously guard their researches it is impossible to form a comparison of the results obtained. It is pretty certain, however, that the problem has been satisfactorily solved in England and the United States. The general features of the battleships lately put upon the stocks, and the particular care taken to protect the superstructures, do not admit of any other interpretation.

Our (French) Naval Ordnance Department, after a brilliant beginning in the study of high-power projectiles, has allowed itself of late to be distanced. About eight years ago, and probably for the first time, experiments were made at Gâvres with thin steel shells charged with melinite. The projectile gave great satisfaction through its ability to traverse thin plates without exploding, but owing probably to some defects in the fuses there were many premature explosions.

The Navy Ordnance Department then abandoned the experiments and went back to the ordinary cast-iron shell, substituting only melinite for the common powder. The latter projectiles are not only wanting in

power, owing to the thickness of the metal, but on account of lack of hardness they are more sensitive to shock than steel shells of thinner make.

The most curious part about it is that the War Department took hold of the experiments abandoned by the Navy and brought them to a successful issue. The War Department possesses at present, if we are to rely on information gathered from various essays, high-power projectiles of all calibers up to 27 cm. The thickness of the shell is only one-tenth of the caliber. The projectile of 27 cm. contains a charge of about 60 kilos of melinite. It is perfectly safe in handling and firing. It is extremely desirable that the Navy resume without delay the study of high explosives. By simply adopting the method in use in the War Department for its projectiles of high explosive charges, the power of the naval armament would be considerably increased. The expense would be small, for it is only a question of manufacturing new projectiles without any alteration in the guns or their installations aboard.

The influence of the introduction of high-power explosives upon the construction of warships can all the easier be predicted now when it is a partly accomplished fact. To the decrease in importance as an offensive factor of the armor-piercing projectile corresponds, as a matter of course, the decrease in importance of the water-line belt as a defensive power. To the possibility of reaching the vitals of the vessel by means of high explosive shells going through and exploding in the upper works, must correspond the greatest possible protection to the superstructures, the adoption of the double-protective deck, and, according to our idea, the elimination of everything not susceptible of protection. The presence of superstructures is a source of danger, not because of their existence, their destruction having little importance from a military point of view, but because they are the means of causing the explosion of high-power projectiles. It is not unlikely that further researches will soon discover the means of penetrating the thickest possible armor. The protection of superstructures must therefore keep on increasing, and, eventually, unless the size of battleships is to be augmented beyond measure, their exposed surface must dwindle down more and more until, after a time, the vessels will nearly resemble the monitor type—the only one that is to some extent proof against the new projectiles. Again, if it be true that high-power projectiles, acting like torpedoes when exploding in the water, are not dangerous in a horizontal firing, it is quite different in the case of a plunging fire. In the first case the projectiles fired almost horizontally have a great chance of rebounding on the water and exploding in the air; in the second, however, falling normally they will burst in the water and damage the hull. Up to the present time, owing to the rolling and tossing of vessels, a plunging fire does not guarantee great accuracy. With a coast battery, however, where the train can be regulated in advance, the result would be to throw in the vicinity of the vessel a perfect shower of projectiles, all acting like so many torpedoes. Nothing can protect a vessel against a plunging fire. If new discoveries, difficult to conceive of at the present time, but still not improbable, should allow of more accuracy in a plunging fire, the defensive power of vessels would be extremely diminished. Their reduced size, joined to high speed and extreme mobility, alone would present some guarantee of protection.

J. L.



## THE TRAINING OF FRENCH NAVAL OFFICERS.

[ENGINEERING.]

The recent establishment in France, by the Department of the Marine, of a technical training college for officers of the Navy is regarded as an important step that has been taken in consequence of sustained efforts made by those most earnestly seeking to raise the standard of efficiency of the French Navy.

In France, as elsewhere, special training is necessary for the creation of naval officers, and it has long been recognized with regret that adequate preparation does not exist there.

When, a short time since, the 1896 budget for the Navy was under discussion in the French Chambers, a careful examination was made of all the schools in which naval or marine officers were specially trained; it was considered that the instruction thus given was very imperfect, and that the existing primary and advanced naval schools involved a great outlay without commensurate return. A general desire was expressed in the Chambers, either that less money should be expended on these schools, or that they should be supplemented by a thoroughly efficient and superior naval college.

There exists in France a superior military college for the benefit of army officers; this is the *Ecole Supérieure de Guerre*, which is established at Paris. Its purpose, as defined by the regulations prepared when it was established, is the development of advanced military studies in order to create thoroughly efficient officers. A condition of admission to this school is that the applicant must have a captain's or lieutenant's rank in one branch of the service—infantry, cavalry, artillery, etc.—must have had five years of service as an officer, and have passed three years with the army or as a military instructor. The candidate must pass an examination, with the permission of the corps commandant, before he is admitted. The details of this examination are changed every year, and approved by the Minister of War. It varies, however, but little, and deals broadly with military tactics, topography, the preparation of plans, history, geography, and equitation; subjects are also given to show familiarity with modern languages, artillery, fortification, international law, etc.

It was with a strong sense of the importance of such facilities for the proper training of naval officers, that the Minister of Marine prepared a scheme, for which he has obtained the Presidential sanction, for the establishment of a superior naval college. The Minister advanced arguments which appeared to him fully to justify such a step. In order to secure the greatest efficiency in the fleet during a time of war, the personnel must have been able beforehand to make itself familiar with the constant changes and transformations that take place in war material. "France possesses no institution where the science of tactics can be properly taught to officers who will be called upon to assume responsible commands at sea; it is necessary that such officers should, from the moment of their going on board ship, be so educated that they could immediately carry out suitable tactics in the presence of an enemy." The Minister also enlarged on the satisfactory results that are now obtained at the *Ecole de Guerre* existing for the benefit of army officers, and he maintained that it was necessary "to create for the marine a corresponding organization. The establishment of such a school implies

a practical training in view of actual war, and as a sailor's most useful place should be on board ship, a floating school is necessary, consisting of cruisers placed under the control of a general commandant. It is only with the facilities that would be obtained by this arrangement that great naval tactical problems, and all the consequences they involve, could be worked out." It is with this object in view that the organization has been completed and the school established "to facilitate the investigation of problems inseparable from modern naval war, and to make as large a number as possible of officers familiar with the duties and responsibilities of command." In order to give as practical an aspect to this scheme as possible, and at the same time to carry it out with as little expenditure as might be consistent with efficiency, the school is installed on board ships already in commission; these vessels constitute an independent naval division under the command of a general directing officer. The existing plan of mobilising the fleet is not in any way modified by this formation, because it will be always possible during the general manoeuvres to summon the several vessels constituting the training squadron, to take their place with the rest of the fleet. At present the training division is made up of three cruisers—the Admiral Charner, the Suchet (these two forming part of the Mediterranean squadron), and the Latouche-Tréville, which has been told off from the northern squadron. Vice-Admiral Fournier has been elected head of the school, and flies his pennant on the Admiral Charner. His staff consists of a captain, two lieutenant aides-de-camp—one of whom is selected from the students—one chief engineer, one assistant engineer from the State dockyard, one director of administration, a division surgeon, and one captain of marine artillery. On board each of the ships forming this division there are a captain, a commander, one chief engineer of the first class and three engineers of the second class, one administering officer, and a surgeon.

The officer-pupils for this school will be selected each year by the Minister of Marine from the general list of lieutenants proposed for advancement; this list is prepared by the Commission de Classement. The officers are nominated in the order in which they stand on the list, exceptions being made of those who are engaged on foreign service. The officer-pupils enter the school without passing any examination; they will remain there during one year, attending courses on the following subjects, among others: naval tactics, organization of attack, theory of naval signalling, coast attack and defense, submarine navigation, theory and practical construction, the actual condition of the French and foreign fleets and their equipments, the general principles of ballistics, torpedoes, machinery, the perforation of armor-plates, the analyses of historic facts that might be useful in their bearings upon modern fleets, the principles of international maritime law, hygiene, etc. During the period of their instruction the students will be examined on these different subjects, and when they leave they undergo an examination before a commission, consisting not only of the director and the captains of the training ships, but also of a vice-admiral commanding a squadron. If the students pass this examination successfully they receive certificates from the commission, and it is from such certified officers, and in the order of their leaving the school, that they will be drafted into the general staff, either for marine or land service. These positions are always one of confidence. In addition to this, one-third of all available commands are to be reserved for these certificated officers, according to their respective grades. The



of cordite were distributed on reticulated shelves was kept at 100° F. a fortnight and then fired. There was no explosion. The slate roof was lifted off by the rush of gas and deposited on the ground beside the building, no more injured than would be accounted for by its fall; the windows in the brick gables were not broken, and the door had to be unlocked to give access to the firemen.

There is, indeed, some difficulty in igniting cordite even when it forms the charge of a gun, and primings of gun-cotton or black powder have to be used in the case of cannon, while in small arms the percussion caps have to be charged with composition which will give a good flash. When, however, the priming is sufficient, misfires and hangfires are rare.

The volume of the chamber of a gun compared with the weight of the charge is a matter of great importance. On account of the relatively large volume of gases given out and their high temperature, compared with the products of combustion of black powder, the density of the charge must be much less. Solid cordite measures  $17\frac{3}{4}$  cubic inches to the pound, and if fired in a chamber of that capacity would give a pressure of at least 120 tons to the square inch, which would, of course, be destructive to any gun. If a density of 54 cubic inches be assigned, as is the case in some of the larger quick-firing guns, a pressure of 40 tons to the inch might be realized, and is nearly the maximum which can be obtained with black powder; whereas, if, say, 100 cubic inches to the pound be the density, as is the case in many guns, the pressure can never rise above 20 tons to the inch; consequently it is found that in guns with high density charges the pressure and velocities are much affected by climatic changes and by the conditions of the bore and of the shot. But even under such unfavorable conditions of density, the regularity of shooting is quite equal to that obtained with black powder.

The diameter of the cords is proportioned to suit the bore of the gun, the capacity of the chamber, and the length of travel of the shot. Up to the present the sizes made range from .01 inch diameter for the service revolver to .5 inch diameter for the new 12-inch naval gun.

With respect to erosion, it may be said that it certainly is not greater than that arising from the use of black powder, and it is of much more favorable kind. Black and brown powders scoop out and plough rough, irregular channels in the bore, whereas cordite appears to wash away the surface in a uniform manner. This effect is probably due to the absence of solid or liquid particles in the products of combustion, and to the presence of a large proportion of carbonic oxide at a high temperature. The erosion extends for only a few calibers along the bore, and owing to these circumstances expanding gas checks on the driving bands of the shot enable the gun to shoot well longer than when powder is used. It should be borne in mind also that the ballistics obtained by the use of cordite are very much higher, as a rule, than with black powder; in the case of the 12-inch naval gun, for example, the energy imparted to the shot is 1.8 times greater than in the old service gun, consequently increased wear must be expected.

The manufacture of cordite is extremely simple. The nitro-glycerine and the dried gun-cotton are mixed together in accurately weighed proportions. The liquid is poured over the gun-cotton, and mixed with it by hand till the nitro-glycerine is completely absorbed, and the resulting mass looks like a quantity of dirty white moist sugar. This mass is then placed into kneading machines with a proper proportion of acetone,

and is incorporated for three and a half hours, when about 5 per cent of vaseline is added, and the kneading continued for another three and a half hours. The mass then becomes a stiff dough, not unlike raw Jamaica sugar in appearance and about the same color, and is ready for squirting into any size or form that may be needed, for unlike the old powders, the composition of cordite is the same in every variety of size produced.

The squirting machines consist simply of vertical cylinders of various sizes, into which the dough is placed. They are fitted at their lower ends with one or more removable dies, and provided with pistons actuated by screws or by hydraulic cylinders. In the former case the pressure of the screw is transmitted through a hydraulic cushion, which gives the means of noting the pressure and also of relieving it when excessive. For the small sizes used in rifle ammunition, the cords are wound automatically as they issue from the dies on to reels holding about one pound each, these are blended together in tens on to a single reel, and six of the latter are combined on one reel, from which the sixty strands are fed into the cartridges. The larger sizes are either wound by hand on to reels, whence they are cut off in lengths, or they are delivered by the press on to an endless band to which knives are fastened at the required distances. The cord lies over the knives, which, passing under a small roller, cut through the cord and leave it ready to be picked off by boys and arranged in shallow trays. The small-arm reels and the trays of cut cord are placed in stoves, in which they are dried by exposure to currents of air warmed up to 100° F., and in this process all the acetone is driven off. When dry, the cut cords, like the cordite on reels, is blended so as to make uniform samples.

The danger of the manufacture is confined to the production of the nitro-glycerine and the drying of the gun-cotton. As soon as the two explosives are mixed together they appear to be incapable of explosion, except when confined in a gun.

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## ELECTRIC TRAINING GEAR.

[ENGINEERING MECHANICS.]

A fifteen horse-power electric motor is used to operate the 9.45-inch gun on French battleships, but only two-thirds of this energy is required. A French engineering works is now completing 40 turrets for battleships. This change in turret management from hydraulic power to electricity has been brought about by Canet in a comparatively short time. Trials have demonstrated the reliability under all conditions. The man in charge of the turret is always enabled to hold it under complete control; not only is he able to arrest the movement of the platform suddenly at any desired moment, no matter what velocity is imparted to the turret, without creating any shock or reaction to the heavy moving mass, but he is able at will to make the fine adjustment in training with great facility and speed through distances less than one fortieth of a degree. Tests of this class were repeatedly carried out at the trials in the presence of a large number of French and foreign naval officers. By the special arrangements introduced into the Canet turret, and the care with which all the parts making up the system are counterbalanced, the power required to revolve the moving parts is reduced to a minimum. The



rifles, mounted in pairs, in two barbette turrets of the balanced type 15 inches thick, firing through an arc of 270 degrees, and eight 8-inch rifles in four barbette turrets 8 inches thick, mounted on the upper deck, and possessing individual arc of fire of 170 degrees.

The secondary battery will be composed of six 4-inch rapid-fire rifles, four of which are mounted on the main deck in armored sponsons and sheltered by thick splinter bulkheads of steel, and the two remaining mounted aft on the bridge deck, sheltered by fixed shields. Twenty 6-pounder, four 1-pounder and four Gatling guns will constitute an auxiliary force and be mounted on the main deck, on the superstructure and bridges and up in the tops of the military post. From the bow or two places on either broadside there are torpedo tubes for the discharge of torpedoes.

The propelling machinery will consist of three double-ended boilers 21 feet long, with diameters of 16 feet 9 inches, and two single-ended boilers 10 feet long, with diameters of 16 feet 9 inches, in four watertight compartments, and of two sets of triple-expansion engines, each in its own compartment and driving its own shaft, having cylinders of 39, 55 and 85 inches and a common stroke of 48 inches. The boiler supplying steam at a working pressure of 160 pounds, and the engines making 112 revolutions a minute, it is estimated that the ship will develop a speed of 16 knots an hour. With her bunkers filled, and at a cruising speed of 10 knots an hour, she should be able to steam about 7400 miles, while at full speed, under like conditions, she should be able to cover 3000 miles and have a radius of endurance of six days. Nearly a hundred auxiliary engines will add to the efficiency of the ship.

The conning-tower, of steel 10 inches thick, just beneath the pilot-house and behind and above the forward 12-inch turret, will be the fighting station for the captain, and through the armored tube leading below there will be means of communication to every important station essential to his knowledge and control in action.

The small rapid-fire guns are mounted in a manner assuring the greatest sweep. The use of wood has been reduced wherever possible, and the major part of that used will be subjected to an electrical fire-proofing process of tried efficiency.

### THE NEW TORPEDO BOATS.

[SCIENTIFIC AMERICAN.]

A second triple addition to the mosquito fleet of the United States Navy has been provided for in the act of Congress of March 2, 1895, appropriating for the construction of torpedo-boats Nos. 6, 7 and 8, the individual cost of which, including governmental superintendence, preparation of plans, and the provision and installation of ordnance outfit must not exceed \$175,000—a moderate allowance, which, but for present prices and skillful management of design, would be impracticable.

With the completion of these and the three other boats authorized in 1894, the service will be possessed of eight craft of this order, representing four periods of constructive and engineering progression within the past six years. Of their kind, that of torpedo-boats pure and simple, the new vessels will be the largest in the world and unexcelled by those of any other nation, while in point of speed and weatherliness they will closely approach the more formidable torpedo-boat catcher—features demanded by our broken coast line.

With a displacement of 180 tons, they will be 170 feet between perpendiculars, with an extreme water-line beam of 17 feet upon a mean, normal draught of 5 feet 6 inches. The hulls are models of the most recent practice, with an easy razor-like entrance and a long fine run below water toward the screws. The "tumble-home," which begins just forward of the midship section, increases afterward, where it broadens out over the propellers, giving a very full water-line area of shallow draught. This flat form of stern prevents the settling so common to torpedo-boats under full power, while holding to the water in all conditions of weather and preventing racing of the screws.

The boats will be built of steel. The armament will consist of three 18-inch torpedo-tubes on swivel mounts and of four 1-pounder rapid-fire guns. Six hundred rounds of ammunition will be allowed for the guns, while four automobile torpedoes—the type yet undetermined—will be provided; the spare one being carried in a steel stowing case on the starboard beam. The torpedo discharges will be arranged on the main deck, two forward and one aft, the forward tubes being placed slightly *en échelon*, admitting of considerable athwartship fire in addition to the extended field of action of each on its own side. The after discharge will be on the center line, and will have an unhampered sweep of 280 degrees. This emplacement is devoid of "dead angles," and gives an all-round discharge of great scope.

The conning-towers, of which there are two, will be near the bow and the stern, each about 35 feet from its respective end. Hand-steering gear will supplement in the forward tower the steam mechanism common to both towers, affording one more chance in case of mechanical failure.

The forward tower will be surmounted by one of the 1-pounder guns, to be worked from a gallery on the after side. The three others will be mounted along the sides, two on the port and one on the starboard.

The freeboard forward is carried up to a height of 12 feet 6 inches, adding materially to the sea-going qualities of the boats while yielding increased berthing space for the crew and a housing for some of the forward mechanisms.

So important is speed in this type of craft that fifty per cent of the total displacement will be absorbed by the boilers, engines and appurtenances, and the magnitude of this amount may best be appreciated when it is known that this allowance is just double that for the motive mechanism of the commerce-destroyers *Columbia* and *Minneapolis*.

The engines, which are of the triple expansion sort, each in its own water-tight compartment and actuating a separate screw, are very fine examples of power and compactness, beautifully balanced, with a very nice distribution and division of weights. With a common stroke of 18 inches, impelled by steam at a pressure of 250 pounds to the square inch, supplied by three water tube boilers that flank the engine space—two forward and one aft—the two six-foot manganese bronze screws will be driven by the engines at the rate of 395 turns a minute, developing an indicated horse-power of 3200, and driving the boats through the water at a speed of 26 knots an hour.

The normal coal supply will be 12 tons, with a total bunker capacity of 60.

There will be no search-lights, but the boats will be lighted by electricity; and natural ventilation will be ample to insure comfort under all conditions of service. Folding boats will be carried.



The officers will be aft, while the crew will be provided for in the forecabin and just below on the berth deck. Excepting the captain and engineer, who will have separate state-rooms and bunks, the two other officers, the four machinists, and the sixteen seamen, each in a common country, will sleep in folding berths, easily turned out of the way to afford added space and comfort when not in use.

No premiums are offered for increased speed, and, with the well-known governmental margin of safety, the penalties for decreased speed need not be feared; while even a more excellent performance may reasonably be hoped for.

One boat will be built by Moran Brothers Company, of Seattle, Washington, for \$163,350, and the two others will be built by the Herreshoff Manufacturing Company, of Bristol, R. I., for \$144,000 apiece.

[ENGLAND.]

#### BRITISH WARSHIP BUILDING NOTES.

[ENGINEER, March 13.]

In view of the new orders for battleships, cruisers, etc., which may shortly be expected to be distributed among the Royal Dockyards and private shipbuilding and marine engineering establishments, the following notes of the progress made with some of the unfinished battleships and cruisers ordered under the late Spencer programme may be of interest at this time.

Of the battleships nearest completion the first to be noticed is the *Renown*, an armored steel vessel of 12,350 tons displacement, which was built at Pembroke and launched last May, and has been engined by Messrs. Maudslay, Sons & Field, of Lambeth. The progress made—after her launch—in fitting the machinery was so rapid that she was enabled to leave Pembroke for Devonport on November 14th under her own steam. The *Renown* is the only ship of her design yet constructed, and it is noteworthy that the new battleships to be built under what we may now, we presume, call the Goschen programme, are all to be of the *Renown* type, but with some increase in displacement and armament. It is also worth noting that the time taken—six months only—in fitting the engines and boilers on board the *Renown* in Pembroke, where very poor facilities for such work exist, was appreciably less than in the case of the *Magnificent* at Chatham, and the *Majestic* at Portsmouth.

The next battleship in order of completion is the *Prince George*, an armored steel vessel of 14,900 tons displacement, built at Portsmouth, and engined by Messrs. Humphrys, Tennant & Co., of Deptford. The whole of this vessel's machinery, boilers, etc., is in place, but the work upon the ship has been very fitful in its progress; it is, however, so far advanced that she will be ready for steaming at moorings in May, for her official trials in July, and it is hoped she will be completed in October.

Rapid progress is being made with the new battleship *Victorious*, lately launched at Chatham Dockyard, and described in our columns, large numbers of workmen of all trades being employed upon her, many of them working overtime. About seven-tenths of the whole weight of the structure, including armor, has been built into her, but the casemates are rather backward, due to their armor not being delivered fast enough from the contractors.

The builders of the engines, Messrs. Hawthorn, Leslie & Co., of Newcastle, are employing a large staff, working overtime, to get the machinery fixed in the ship as soon as possible. The main engines and boilers are now in place and in a forward state, and the fixing of the auxiliary machinery, which includes about eighty sets of engines, is being rapidly proceeded with. The armament is being fitted in place, and the hydraulic machinery for working the 12-inch breech-loading guns to be carried in the barbettes is also being steadily advanced. Every exertion is being made to have a trial of the machinery of the ship in the dockyard basin in June, and it is expected that the vessel will be able to proceed to sea for her official steam trials in July, and be finally completed next October.

The first-class cruiser *Powerful*, building by the Naval Construction and Armaments Company at Barrow, is rapidly approaching completion, the whole of the structure of the hull and steel work in her being finished, and the armor of the barbettes, casemates and conning-towers in place. All decks are laid, bridges and deck-houses up, masts and fighting tops stepped, and the rigging practically complete. The steering, windlass, capstan and hoisting engines and gear, with the anchor gear and air-compressing machinery, are all in place and complete. The magazines, shell and store-rooms are lined and fitted, and rapid progress is being made with the ventilating systems, electric light installations, telegraphs, etc.

The main engines and all the boilers, which are of the Belleville water-tube type, thirty in number, are now in place, leaving only the armor gratings and castings over the boiler-rooms to be closed and finished, and it is expected to have steam up in a couple of months.

The *Terrible*—sister ship to the *Powerful*—building by Messrs. J. and G. Thomson, of Clydebank, is making very fair progress towards completion, but in consequence of the late strike in the Clyde district, and the engineers having only lately resumed work, the construction of the ship has been much retarded. As, however, the contract date for her delivery is January, 1897, this will no doubt easily be anticipated by her builders.

The work of completing and getting ready for sea the new second-class protected cruiser *Minerva*, whose float out at Chatham Dockyard was recorded by us last September, is being pushed along at a truly marvellous rate. This vessel, it will be remembered, is being supplied with her propelling machinery by the engineering department of Chatham Dockyard, and it being desired that her steam trials may take place in May, and her final completion be effected in July, a very large number of all classes of workmen is employed upon her with this object. The material now worked into her weighs nearly 2400 tons, including armor; the fixing of her machinery is far advanced, the work of fitting her armament on board is well forward, and her torpedo-tubes are nearly complete. This vessel has a coal capacity of 550 tons, and her engines, which are of the three-cylinder inverted triple expansion type, driving twin screws, are expected to develop 9600 indicated horse-power under forced draught to her boilers, and to give her a speed with that power of  $17\frac{1}{4}$  knots.

The progress of construction of the armored battleship *Illustrious*, now building at Chatham, is very much behind, when compared with the celerity shown in the building of her sister ship, the *Magnificent*, at the same yard. The first-named vessel was laid down just a year ago, but is as yet only plated up to the armor deck, some only of the frames of the



There is a complete installation of electrical ventilating fans, besides other modern appliances calculated to promote the comfort of passengers. The machinery consists of two independent sets of triple-expansion engines, each driving a bronze screw, and a fair rate of speed is expected.

[JAPAN.]

### THE BATTLESHIP YASHIMA.

[ENGINEER.]

On February 28th the first-class battleship Yashima was launched from the Elswick shipyard of Messrs. Sir W. G. Armstrong & Co., of Newcastle-on-Tyne. She is being built to the order of the Japanese Imperial Government, and was commenced on December 6th, 1894, so that little over a year has been occupied in completing her for the launch, and it is expected that she will be completed for sea, with all armament on board, in about the same time. The dimensions and particulars of the vessel are as follows:

Length between perpendiculars.....	372 ft.
Breadth, extreme.....	73 ft. 6 in.
Draught, mean.....	26 ft. 3 in.
Displacement, in tons.....	12,300
Indicated horse-power, forced draught.....	14,000
Indicated horse-power, natural draught.....	10,000
Speed, forced draught, estimated.....	18½ knots
Speed, natural draught, estimated.....	17¼ knots
Coals carried at designed draught.....	700 tons
Coals carried with bunkers full.....	1200 tons

She is provided with a steel armor belt 8 feet in width, carried from 3 feet above to 5 feet below the designed load water-line. This belt extends over a length of about 230 feet, and has a maximum thickness of 18 inches, tapered to 14 inches at the extreme ends. The thwartship armor bulkheads which terminate the belt are 14 inches thick.

Immediately above this belt there is a light belt of armor 4 inches thick, terminated by screen bulkheads extending from the sides of the vessel to the barbettes armor. Behind this 4-inch armor coal bunkers are arranged, so as to afford additional protection against gun-fire. A protective deck 2½ inches thick is worked horizontally over the main belt and bulkhead armor, and under-water decks of the same thickness give protection to the ends of the ship outside the limits of the armor. At the fore-and-aft ends of the belt, rising directly from the protective deck, are the two barbettes, formed of steel armor, 14 inches thick on the upper portions, reduced to 9 inches below.

The main armament of the Yashima will consist of four 12-inch 49-ton guns mounted in pairs in the barbettes previously referred to, and having also the protection afforded by 6-inch armored gun-houses. The foremost pair train from direct ahead to 30 degrees abaft the beam, and the aftermost pair through a similar arc.

The auxiliary armament will consist of ten 6-inch 100-pounder quick-firing guns. Four of these guns will be mounted on the main deck in armored casemates 6 inches thick, and six on the upper deck in sponsons and protected by heavy shields. In addition there will be twenty-four 3-pounder guns, four mounted in the fighting tops, eight on the shelter decks, four on the bulwarks and on the main deck. There will be five

fixed torpedo-tubes, one above water forward, and four submerged, two forward and one aft. All the armament is being constructed at Elswick. The Yashima will be propelled by twin-screw triple-expansion machinery, constructed by Messrs. Humphrys, Tennant & Co., of Deptford. Steam will be generated in ten single-ended cylindrical boilers, with a working steam pressure of 155 lb. There will be a great number of auxiliary engines throughout the ship, amongst which will be included the steering engines, air compressing engines, evaporating engines, capstan engines, distilling engines, hydraulic engines, and steam pumping engines for working the big guns.

[MARINE RUNDSCHAU.]

A contract has been closed with the firm of Armstrong & Co. for the erection of steel works in Japan. The specifications, according to Japanese newspapers, are as follows:

1. The materials to be supplied from England.
2. Of the workmen employed in the works, twenty per cent shall be Englishmen, the remainder Japanese.
3. Whenever a new weapon is invented in England it will be reproduced in the Japanese works.
4. A subsidy is to be paid to the Armstrong Company for a period of years.
5. After expiration of this period, the works are to be sold to the Japanese Government.

[SPAIN.]

The Spanish Government has ordered two torpedo destroyers in England. They are to steam at the rate of 28 knots per hour.

The torpedo cruiser Filipinas has been completed at Vea Murgia. The dimensions are: Length, 243 feet; breadth, 26 feet; draught, 9½ feet; displacement, 750 tons; speed, 20 knots. Radius of action of 3000 seamiles. Armament, two 12 cm. B. L. R. with hydraulic recoil mounts, one forward, one aft, four 4.2 cm. Nordenfeldts, two 11 cm. Gatlings, and four under-water torpedo-tubes for Schwartzkopf torpedoes.

[AUSTRIA.]

[ENGINEER.]

On January 31st the official trial was made with the sea-going torpedo boat Viper, built for the Imperial and Royal Austro-Hungarian Government by Messrs. Yarrow & Co., Poplar. This vessel is 147 feet 6 inches long by 14 feet 9 inches beam, and was guaranteed to attain a speed of 24 knots when fully equipped and loaded, with 26 tons to represent armament. The Viper left Messrs. Yarrow & Co.'s yard at ten o'clock in the morning, and commenced her three hours' trial about noon at Thames Haven. During the middle of the three hours' trial six runs were made on the measured mile, during which the mean speed attained was 26.633 knots, and the mean speed for the three hours' continuous run was 26.638 knots—i. e. 2.638 knots in excess of the contract speed. The vibration was practically nil at all speeds, the machinery being balanced on the system first introduced by this firm. After the run the usual



manœuvring trials were carried out, all of which proved satisfactory. The boilers are of the Yarrow type, with straight tubes and no outside down pipes. The above result was obtained with an air pressure in the stokehold averaging seven-eighths of an inch of water.

[HOLLAND.]

[ROYAL UNITED SERVICE INSTITUTION.]

In the budget statement the minister declares that, with the exception of the armored ships Reinier Claezen, Evertsen, Kortenaer, Piet Hein, the protected cruisers Koningin Wilhelmina and Sumatra, and some torpedo-boats, the whole fleet is antiquated; further, that as the hulls of many of the older ships have become very deteriorated, their boilers and engines being also worn out, and their fighting value very small, it is wiser to spend money in replacing them in preference to patching them up any more. A complete reconstruction of the fleet is necessary, and a commencement has been made with the larger ships. For general service and for the auxiliary squadron ten new ships, and for home defense six new ships are necessary.

Although nominally the Netherlands fleet is, comparatively speaking, considerable, yet, in reality, as the minister states in his report, the number of serviceable vessels is very small indeed. The three new coast-defense armor-clads Evertsen, Kortenaer, and Piet Hein, now approaching completion, will be useful little vessels, but they are solely intended for coast defense; they only displace 3400 tons, their engines of 4500 I. H. P. giving a speed of 16 knots; protection is afforded by a 6-inch complete water-line belt; the armament consists of three 21-centimeter (7.9-inch) guns, of which two are mounted in a 10-inch armored turret forward, and the third is aft on the poop, protected by a steel shield; two 6-inch quick-firing guns are in sponsons, one on each beam, and there are further distributed in the tops and other parts of the ships 14 small quick-firing guns and three torpedo discharges.

[SWEDEN.]

In 1896 there were appropriated 1,500,000 crowns for the building of new ships. Under construction are (1) the armor-clad Oden, commenced in 1895, to be completed in 1897; (2) the torpedo cruiser Oern, the cost of which, including torpedoes, armament, ammunition, is to be 878,000 crowns. The vessel is twin-screw, of following dimensions: Length, 222 feet; breadth, 27 feet; draft, 9 feet; displacement about 670 tons. The armament of two 12 cm. guns and four 57 mm. rapid-fire guns. One bow torpedo-tube. The two engines, protected by a protective deck, to develop 4000 H. P., giving a speed of 19 knots. The Oern is building in Göteborg and must be delivered in August, 1896; (3) one first-class torpedo-boat of 85 tons, with a speed of 23 knots, with two torpedo-tubes, one fixed in the bow and the other, a moveable one, aft, is building at the Schichau works, to be completed in August, 1896.

[BRAZIL.]

The Brazilian Government has recently placed an order for two iron-clads with the La Seyne shipbuilding yards, France. The *Standard* says the Brazilian Government will also shortly place contracts for three

4000 tons, 19½ knots, protected cruisers, ten ordinary torpedo-boats, eight torpedo-boat destroyers, and five submarine torpedo-boats.

[ARGENTINA.]

The Argentine Government has ordered eight new war vessels, to be built in England, viz: (1) the cruiser San Martin, somewhat smaller than the Buenos Aires, (2) a torpedo-boat destroyer of 30 knots, and (3) six torpedo-boat destroyers of 27-knot speed.

Arrangements have also been made with the Schneider Company of Creusot to place a battery of rapid-fire guns upon the battleship Almirante Brown.

The contract for the purchase of the Italian ironclad Saint Bon has been signed in Argentina, and it is very possible that the purchase of this powerful vessel will be followed by the acquisition of the Verese or Emanuele Filiberto, both splendid war engines.

Argentina has, besides this, engaged the services of Senor Luiggi, one of the best naval engineers in Europe, to fortify the long and perfectly open stretch of coast on the Zarate war arsenal, which will serve as a basis or foundation for fortifying the Argentine coast and making it next to impregnable.

[CHILI.]

Messrs. Laird Brothers, of Birkenhead, launched the Capitan Orella and Capitan Muniz Gamero, two of the four 30-knot torpedo-boat destroyers which they are constructing for the Chilian Government, similar to the boats of the same class which they are building for the British Government. The Capitan Orella was only ordered in August last.

The Chilian cruiser Ministro Zenteno was launched February 1st at Elswick. She is 330 feet 5 inches long by 45 feet 9 inches broad, has a displacement of 3450 tons, and will have a speed of twenty knots. Her armament is to consist of eight 6-inch, ten 6-pounders, and four 1-pounder quick-firing guns, with three torpedo-tubes.

[LIBERIA.]

GUNBOAT ROCKTOWN.

[THE STEAMSHIP.]

The vessel is 100 feet long between perpendiculars, or 119 feet extreme, 20 feet wide and 10 feet deep, the load draught being 7 feet. The hull is divided into seven water-tight compartments, and is entirely built of Siemens-Martin steel, with Lloyd's scantlings for the highest class. The engines are compound surface-condensing, the air, circulating and bilge pumps being driven off the main engines in the usual way. The cylinders are 15½ inches and 28 inches in diameter by 16-inch stroke. The boiler is of the ordinary return-tube type, of steel with steel tubes, and constructed to Board of Trade requirements for a working pressure of 100 pounds to the square inch. The boat carries a 57 mm. quick-firing Nordenfeldt gun on shielded mounting on the forecastle deck, and three 80 mm. breech-loading guns at the sides and on the poop deck. The trials of the gunboat were carried out on the river Maas, from Rotterdam to the Hook of Holland, both for speed and for the armament, and the conditions were successfully fulfilled, the mean speed of six runs being over twelve miles, and the machinery working smoothly throughout.





## BOOK NOTICES.

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THE NAVAL POCKETBOOK, 1896, by W. Laird Clowes, published by the Tower Publishing Company, Limited, London, is the first issue of a proposed handy annual of facts and figures relating to the navies of all nations. It shows evidence of much care in compilation, and is well indexed. As special features, it contains profile and deck plans of nearly all the latest warships, showing their armor and the distribution of their batteries; and "trial trip tables," wherein is given, for a knot made in an observed interval of time, the corresponding speed of the vessel in knots per hour, the tabulated time intervals being tenths of seconds. A list of the dry-docks of the world, with their principal dimensions, is also one of the valuable features of the book. Its pocket size and moderate price, five shillings, should transfer much valuable information from reference books in a ship's library to the pocket of every officer.

J. M. E.

The 9th Annual of AIDE-MÉMOIRE DE L'OFFICIER DE MARINE, 1896, by Edouard Durassier, continued by Charles Valentino, published by Henri Charles-Lavauzelle, Paris, contains very complete statistics of the *matériel* and personnel of the navies of the world. These statistics, although not entirely free from minor errors, which can and should be eliminated, are, in the main, correct and well arranged. Republished in this edition from the *Revue Maritime et Coloniale* are some "deductions drawn from the battle of the Yalu and from the maritime operations of the Japanese," which are worthy of careful study by every naval officer. Thirty-six pages are devoted to a handy *résumé* of maritime international law. The tabulation of the cable communications of the world is a particularly valuable feature and could be doubled in value by the tabulation of cable rates. The book is of handy size, well printed, and moderate in price.

J. M. E.





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[AMERICAN.]

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MARCH. A Decennium of Military Progress. The Balloon in the Civil War. Limitations of the National Guard. Military Duties in Aid of Civil Power. The Defense of our Frontier. Instruction of Sea-coast Artillery. Alaskan Notes. Reprints and Translations.

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JANUARY, 1896. Quadruple Expansion Engines for Lake Service.

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JANUARY, 1896. A New System of Machine Telegraphy. Metallurgical and other Features of Japanese Swords.

FEBRUARY. Commerce and Deep Waterways.

MARCH. The Marsden Corn-pith Cellulose (by Lewis Nixon).

Mr. Lewis Nixon says: "We may sum up, that what appears to be the present policy of our Navy Department is not to give vessels abnormally great metacentric heights, as they want them to be at their best when they begin fighting, and not wait until they are dangerously punished before they become good gun platforms. The best way seems to be to fix a reasonable metacentric height and then take means to keep it. The Department's use of armor, armor decks and cellulose seems to meet this problem well. With the perfect obturation which can be obtained with the corn cellulose, naval designers can settle upon the metacentric heights and other features of their designs with confidence that they can be retained in an engagement. Our cruisers of the Baltimore type, if they are provided with a cellulose belt, would be warranted in engaging many of the second-class ironclads of other powers; without it they are liable to be sunk by a well-directed machine gun fire. This product of American farms affords a cheap and ready means of vastly increasing the efficiency of our cruisers, and the unarmored sides of all our vessels should have these belts without delay. This discovery and application of cellulose is



of as vital importance to our Navy as the development of Harveyized armor and smokeless powder. This follows from the fact that without adding very much to the cost of our vessels we can greatly increase the efficiency of them all by making their sides automatically resist the inflow of water, and as our cruisers carry heavier batteries than similar vessels of other nations, they would, when so protected, be able to give battle to ships far heavier than themselves."

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JANUARY, 1896. Prince Eugene at Belgrade. Korea in July, 1895. The English Soldier: as he was and as he is. Reminiscences of Seattle, Washington Territory, and the U. S. Sloop-of-War Decatur, during the Indian War of 1855-56. Notes on England's Navy.

FEBRUARY. The Old South still. General Jackson at New Orleans. Five Weeks with the Cuban Insurgents. Famous Words of Great Commanders. Reminiscent of the "New Ironsides" off Charleston. Naval Progress in 1895.

MARCH. Did Grouchy by Disobedience of Orders cause the Defeat of Napoleon at Waterloo? Ironclads in Action. Naval Progress. Naval and Military Notes.

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#### ENGINEERING MECHANICS.

FEBRUARY, 1896.—

A new method of face-hardening armor is being tried at the Pannier works. One face of the ingot intended for the armor plate is carbonized directly at the time of being run into the mold. This is effected by lining one wall of the mold with the necessary carbonizing material, which must, it is stated, be free from occluded gases, and of great durability, so as to remain stable during the process of casting. Experience has shown that the amount of cementation obtained varies with the carbonizing material used, about twice as much effect being obtained with charcoal as with coke. On withdrawal from the mold the cemented surface is slightly wrinkled, but this disappears in the after-working of the ingot. The heaviest ingot yet dealt with in this way weighed 3 tons, and was reduced from its initial thickness of 16 in. to 4 in. by forging and rolling. An examination then showed that for  $\frac{1}{2}$  in. from the face the metal contained 1.78 to 1.50 per cent. of carbon, which decreased regularly to between .25 and .15 per cent. at the back of the plate.

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The Medical Aspect of the Nicaragua Canal.

Report of Passed Asst. Surgeon E. R. Stitt, U. S. N.

JANUARY 23. A New Steamship Coaling System.

## JOURNAL OF THE AMERICAN SOCIETY OF NAVAL ENGINEERS.

Vol. VII., No. 4. Contract Trial of the United States Coast-line Battle-ship Indiana. The Steam Yacht Yosemite. Test of a Babcock and Wilcox Boiler to determine its Evaporative Efficiency. Torpedo-boat Destroyers. Experiments to determine the Causes of Steam Pipe Explosions on board German Naval Vessels. Liquid Fuel for Naval Purposes. Trials of the Lake Steamships Zenith City and Victory.

Vol. VIII., No. 1. Contract and Screw Trials of the U. S. S. Katahdin: relation of the Duties of the Naval Engineer Officer to the Problem. Contract Trial of the Machinery of the Texas. The Reliability of Throttling Calorimeters. Measurement of Temperatures of Steam. Description of Experiments made at Yarrow & Co.'s Works. On Comparison of Mechanical Drafts. Belleville Boilers. The Accident on the St. Paul. Ashlin's High Pressure Compound System. A New Goubet Submarine Boat.

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JANUARY 2, 1896. The New Army Magazine Rifle. Data about Torpedoes.

JANUARY 9. The New Colt Automatic Gun. The Necessity of Thorough Coast Defense.

JANUARY 16. High Explosives in Warfare.

JANUARY 30. Experiments showing Circulation in Water-Tube Boilers. A New Torpedo-destroyer. Specifications for Marine Boiler Steel.

FEBRUARY 20. Firing Tests of Krupp Armor Plate.

## SCIENTIFIC AMERICAN.

JANUARY 4, 1896. The Argentine Cruiser Buenos Aires. Our Defenseless Condition. The Bridge of an Ocean Liner. The United States Battle-ship Iowa. New Submarine Boat.

JANUARY 11. Wire Wound Guns adopted in the British Service.

JANUARY 18. The Light Draught Composite Gunboats. The Advantages of the Induced over the Forced Draught System. Improved Arms for the National Guard. The New Torpedo-boats.

FEBRUARY 1. The Timber Dry Dock No. 3 at the New York Navy-yard.

FEBRUARY 8. The Power of Guns. Cape Hatteras Light-house. Stranding of Steamship St. Paul.



FEBRUARY 15. Launching of the U. S. Gunboat Helena. Firing the Indiana's Big Guns.

FEBRUARY 22. Soapsuds on the Waves.

Some experiments have recently been made, says Railroad Gazette, which show that soapsuds will reduce a sea almost as well as oil. This was first tried on the Scandia, an English steamer, in a storm on the Atlantic. Having no great quantity of oil, the master dissolved a large quantity of soap in water, which was discharged over the bow. The effect was nearly instantaneous, the height of waves being so diminished that the vessel could be managed without difficulty. Captain Le Gall, of the French steamer Sénégal, sailing the Adriatic, was struck by a squall and used soap and water with same result. He used three kilogrammes of soap dissolved in 70 liters of water. The solution when dripped over the bow made a quiet space about 10 meters wide, preventing the waves from breaking over the vessel.

MARCH 14. Defense of New York Harbor. Inaccessible Maritime Lights.

Description of electric buoys of New York harbor.

MARCH 21. The United States Cruiser Olympia.

A good description of Olympia and comparison with the Eclipse and Blanco Encalada.

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FEBRUARY. Modern Ship-building Tools. Long Distance Electric Power Transmission in the United States. Biographical Sketch of John I. Thornycroft.

MARCH. Some Recent Departures in Steam Engine Piston Construction. Modern Ship-building Tools.

#### [FOREIGN.]

##### THE ENGINEER.

JANUARY 3, 1896. The Engineer in Naval Warfare. War Material.

JANUARY 10. Circulation in Water-tube Boilers. American and Russian Armor Trials. The Royal Ordnance Factories. Corn-pith Cellulose for War Ships. The Buffington Crozier Disappearing Gun Carriage.

JANUARY 17. Naval Architecture: a Few Principles Popularly Explained: I. Displacement. Double Forged Carnegie Armor. Canet Electric Turrets.

JANUARY 24. The World's Principal War Fleets. Construction of Modern Lighthouses. The Blake Electric Rifle.

JANUARY 31. Steam Launch for Ambulance Service. Krupp's Armor in 1894-95. The Royal Ordnance Factories.

FEBRUARY 7. Naval Architecture: a Few Principles Popularly Explained: II. Stability. Torpedo-boat Destroyers. The Navy and the Admiralty.

FEBRUARY 14. The New Electric Drill for Naval Construction. Coast-defense Ships. The Harbors of India. A Feature of the New Naval Programme. The Reed Water-tube Boiler.

FEBRUARY 21. The Two New Docks at Portsmouth. Launches of H. M. S. Pelorus and Desperate.

FEBRUARY 28. Naval Architecture (cont.): III. Stability. Engine Rooms of Destroyers. Modern War Ships and Dock Entrances. Carnegie's Double Forged Plates.

Experiments are being carried out by the German Admiralty with petroleum fuel on board the Carola, the Siegfried, and several torpedo boats. The ironclads Odin and Egir and Ersatz Preussen, now in course of construction, are to be fitted for this description of fuel. In our own Navy, the Gladiator will be the first ship fitted with apparatus for burning liquid fuel. It will be carried in tanks, but, oddly enough, the Gladiator will have larger coal capacity than the Eclipse class, which seems to show that the Admiralty does not yet take oil fuel quite seriously.

MARCH 6. Quick-fire Gun Sights. Engineers in the United States Navy. Anchor Gear of H. M. S. Victoria. Belleville Boilers in the Royal Navy. The Naval Program of 1896. Launch of the Japanese Battle-ship Yashima. H. M. S. Doris.

MARCH 13. Cordite. British War Ship Building Notes. Collisions at Sea. Present Strength of the New U. S. Navy.

MARCH 20. Naval Architecture (cont.): No. IV. Stability. The Element of Force in War Ships.

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JANUARY, 1896. Notes on the German Siege Artillery and 4-Gun Field Batteries. Hints for the Guidance of Officers, at Foreign Stations, in the Detection of Precious Stones.

FEBRUARY. Capillary Ripples. Verifying at the Mean of the 100 Yard Bracket.

MARCH. Incidents of Bush Warfare. Adjustable Pointers for Concentrating the Fire of Guns in Groups.

#### ANNALEN DER HYDROGRAPHIE UND MARTIMEN METEOROLOGIE.

Vol. XII., 1895. The Typhoon of September 8 to 11, 1894, in the China Sea.

Experiences on the St. S. Tai-cheong in crossing the path of an advancing typhoon from the northeast to the southwest semicircle.

Uses of Photography in Navigation.

Four illustrations of views taken on board a steamer going 11 knots, with an ordinary camera, of headlands and the port of Las Palmas, distant from 1 to 2 sea-miles.



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FEBRUARY 22. Launch of Pelorus and Desperate. The Health of the Navy. Expeditions Over Seas.

MARCH 7 & 14. The Navy Estimates. The Command of the Sea. Coast-defense Artillery.

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FEBRUARY. Electric Lighting in the Dutch Navy. Marine Boiler Explosions. Experimental Theory of the Steam Engine. The Blake and Knowles Independent Air Pumps. Experiments with Water-tube Boilers. Naval Notes.

MARCH. Repairing a Broken Trust Shaft at Sea. M'Kinell and Buchanan's Patent Indicator. Worthington Pumps and Feed Heaters. Screening of Ships' Side-lights. The Latest U. S. Torpedo-boats.

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FEBRUARY. The Production of Modern War Material in the United States of America. Naval Aspects of the China-Japan War. The Eyesight of the Soldier. Visual Signaling. The Seamen of the Guard.

MARCH. Our Sea-borne Commerce and Mercantile Marine. The Tactics of the Future. The Native Levy in the Ashanti Expedition.

#### ENGINEERING.

JANUARY 3, 1896. The 8-inch Guns of the Buenos Aires. Propelling Engines of the Spanish Cruiser Emperador Carlos V. Water-tube boilers. Torpedo-boat Destroyer Desperate.

JANUARY 10. The Stranding of French Battle-ships. Circulation in Water-tube Boilers. The Gunnery Trials of the Buenos Aires.

The principal armament consists of two 8-in. quick-firing guns, four 6-in. quick-firing guns, and six 4.7-in. quick-firing guns. There are also ten 3-pounder Hotchkiss guns, and six 1-pounder or 37-mm. Maxim-Nordenfelt automatic guns.

All the large guns are of 45 calibers in length, the Buenos Aires being the first cruiser carrying all her large quick-firing guns of this nature. The consensus of opinion appears to be so favorable to the arrangement, and indeed the ship carries her long guns so well, that it seems probable this ratio of length to bore, or perhaps indeed a higher one, may soon become the rule.

There are two 6-in. guns forward, one on each broadside, capable of firing from right ahead to 60 deg. abaft the beam; and two aft, one on each broadside, capable of firing from right astern to 60 deg. before the beam. These guns stow in the fore-and-aft line, their muzzles being close up against, but outside, the bulwarks supporting the bridges, and entirely within the ship's side.

The three 4.7-in. guns on each broadside have firing angles of 60 deg. before and abaft the beam; they also stow on the fore-and-aft line, but are trained inboard into the stowing position, their muzzles being elevated as necessary to clear the berthing as they are brought into position. It will thus be seen that all the guns are stowed with their muzzles within the ship's side, and yet there are no sponsons. The arrangement appears admirable, and seems at once to remove the usual objections to long guns.

These guns in the Buenos Aires have 2570 foot-seconds muzzle velocity, the projectile being 45 lb. for the 4.7-in. and 100 lb. for the 6-in., and the maximum chamber pressures being 15 tons per square inch.

The gun mountings are of the latest Elswick pedestal type. The shields for all these guns have a thickness of  $4\frac{1}{2}$  in. in front, tapering to the rear. The training is easy, so much so, that even with the 6-in. guns it can be done by the shoulder, without the assistance of gearing, which is, however, supplied in case of its being preferred.

JANUARY 17. The Machinery of H. M. S. Renown. The Gordon Disappearing Carriage for 10-in. Gun.

JANUARY 24. Gun Sights. Our Naval Position.

JANUARY 31. Barbette Carriage for U. S. 8-in. B. L. Gun. The Development of the Japanese Merchant Marine.

FEBRUARY 7. The Training of French Naval Officers.

FEBRUARY 21. Engines of Torpedo-boat Destroyers: Handy, Hart, and Hunter. Water-tube Boilers for the Dutch Navy.

MARCH 6. The Japanese Battle-ship Yoshima. The Royal Italian Armor-clad Sicilia. The Navy Estimates.

MARCH 13. The Italian Armor-clad Sicilia.

MARCH 27. Water-tight Doors and their Danger to Modern Fighting Ships. H. M. S. Desperate.



## MITTHEILUNGEN AUS DEM GEBIETE DES SEEWESENS.

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No. 3. The French Fleet Manœuvres, 1895. The English Fleet Manœuvres, 1895. Report on the Extension of the Suez Canal. The Chinese Torpedo-boats No. 558 and 559. Foreign Navies.

No. 4. The Effectiveness of Naval Warfare and the Changes in its Character with the Times. Submarine Harbor Defense: Methods and Problems. The Submarine Boat Goubet No. 2. Foreign Navies. H. G. D.

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No. 1, 1896. Minor Notices: Building Gunboats for the Great Lakes. Battery of Dynamite Guns.

No. 9. The Krag Jorgensen Rifle in the United States.

Nos. 11 & 13. New Rules for Small Arm Target Practice. Shall the Field Battery of the Future consist of Six or of Four Pieces?

No. 14. Firing Rules for Field Artillery.

No. 21. Russia.

On January 9 a higher course of study of naval sciences was opened at the Nikolas Naval Academy. The course will comprise the following subjects: Naval Strategy, Naval Tactics, Naval and Military Statistics and Geography, Naval History, Marine International Law. In addition, practical exercises in naval tactics and strategy will be engaged in. The course thus comprises such subjects as are required by commanders of ships and of squadrons. The course is open to staff officers and flag lieutenants who have held their positions at least six years and who have completed the courses at the naval artillery or torpedo schools. This year the course is to last only four months. Next year it will commence on October 1 and end May 1 of the following year. There are no examinations, but at the end of the course the knowledge acquired will be shown by written essays. Nineteen officers take this year's course.

Nos. 25 & 27. Distribution of Vessels of the Italian Navy. Naval Construction in Sweden.

## MARINE RUNDSCHAU.

JANUARY, 1896. The Oldest German Book on Naval Construction. The Cost of England's Ships of War (conclusion). Ascension of a Cameroon Peak. Foreign Naval Notes.

FEBRUARY. Blockade in Relation to Naval Strategy. The Value of Stars in Navigation. The Construction of the Harbor of Emperor Alexander III. Foreign Naval Notes.

MARCH. Collections for the German Fleet. Water Tubular Boilers. Armor Tests of 80 and 100-mm. Nickel Steel Krupp Plates. Foreign Naval Notes. H. G. D.

#### LE YACHT.

No. 924, NOVEMBER 23. Assignments of Torpedo-boats in Times of Peace.

No. 925, NOVEMBER 30. The Grounding of the three Battleships at La Badine.

No. 927, DECEMBER 14. The Reforms carried out by the Minister of Marine.

No. 928, DECEMBER 21. The Navy Estimates for 1896. The New Constructions.

No. 929, DECEMBER 28. The Indispensable Fleet, by Rear-Admiral Fournier.

This remarkable book, the full title of which is "The Necessary Fleet, its Strategic, Tactical and Economical Advantages," is divided into two parts, the 1st treating of the fleet as regard the material, the 2nd relating to the advancement of the personnel. In the first volume the Admiral establishes the principle of a homogeneous fleet of a superior type of sea-going and fighting ships, and advocates for the composition of the naval forces a series of squadrons formed of a certain number of identical vessels, accompanied by torpedo-boats. These vessels should be of the Dupuy-de-Lôme class enlarged, displacing about 8300 tons. Their entire upper works would be protected by extra-hardened steel plates 150 mm. thick, their speed and radius of action to be as considerable as possible. Their armaments would consist of below-water-line torpedo-tubes and R. F. 16-cm. or 19-cm. guns. In the second volume the author deals mathematically with the intricate question of stagnation in the Navy, and presents nearly the identical features of the state of affairs in our own Navy.

No. 930, JANUARY 4. The Navies of the World in 1895.

No. 931, JANUARY 11. The Superior School of War.

By a decree dated last December, a superior school for naval officers was established. Three months later it was in operation. The school comprises three vessels forming an independent flying division under command of Rear-Admiral Fournier, Superintendent. The new school in its present organization is variously commented upon in the Navy.

Nos. 934 & 935, FEBRUARY 1 & 8. The Merchant Marine and the Association Technique Maritime.

No. 937, FEBRUARY 22. Modern Projectiles. Advancement in the Navy.

FEBRUARY 29. Proposals for the Construction of a Submarine Boat. J. L.



## SOCIÉTÉ DES INGÉNIEURS CIVILS.

OCTOBER, 1895. Experiments on the Consumption of Steam in the Laval Turbine. Electric Tramways with Underground Cables.

NOVEMBER. Electric Appliances in Railway Traffic. Increase of Speed in Express Trains in France. The Use of Glass in Electrical Industry.

DECEMBER. The New Chapsal Electro-pneumatic Brake. Resistance of Sandy Soils to Vertical Loads and to their own Weight. J. L.

## REVUE DU CERCLE MILITAIRE.

NOS. 50 & 51, DECEMBER 14 & 21, 1895. The New Regulations for the German Cavalry (see preceding numbers).

NO. 1, JANUARY 4, 1896. The Pantometric Compass-guide. The German Imperial Manœuvres judged by an Englishman.

NO. 2, JANUARY 11. The Complementary Officers in the French Army. The Pantometric Compass-guide (cont.).

NO. 3, JANUARY 18. The Italians in Erythrea. A New Process of Disinfection in the Prussian Army.

NO. 4, JANUARY 25. Recruitment in the English Navy. The Supplementary Officers. The Pantometric Compass-guide (cont.).

NO. 5, FEBRUARY 1. The Italians in Erythrea (with map). The Schoedelin Quadricycle. Fire Engine (with photographs).

NO. 6, FEBRUARY 8. The Supplementary Officers (end). The Pantometric Compass-guide. The English Naval Situation.

NO. 7, FEBRUARY 15. Preserved Meat for the Army. The Automatic Colt Gun (with photographs).

NO. 9, FEBRUARY 29. Opinion of General Dragomiroff of the French Soldier. J. L.

## REVUE MARITIME ET COLONIALE.

DECEMBER, 1895. Accurate Reckoning of the Position of the Ship at Sea by Means of any Two Altitudes. Use of Photography in Oceanography. The War between China and Japan. Deductions drawn from the Battle of Yalu and the Japanese Maritime Operations.

The following points drew principally the attention of the Japanese officers at the battle of Yalu: 1st. The importance of uniformity of speed in vessels composing the same squadrons. 2nd. The danger of keeping on deck spare ammunition for R. F. guns. 3rd. The danger presented by torpedoes when above the protective deck at the moment of launching. 4th. The risk of fire arising from wooden frames or inflammable fittings on board of vessels. 5th. The trouble caused by the escape of smoke and gases from funnels when pierced by the enemy's projectiles.

The Bouvine's Electric Apparatus. Firing upon Concealed Positions. Diseases among Sailors and Nautical Epidemics.

JANUARY, 1896. A Note on the Capsizing of Torpedo-boats. Geometry of Diagrams (cont.). About Collisions at Sea.

FEBRUARY. A Study of the English Torpedo-boat Destroyers. The English Naval Manœuvres of 1895. Diseases among Sailors and Nautical Epidemics (cont.). J. L.

#### LE MONITEUR DE LA FLOTTE.

No. 48, NOVEMBER 30, 1895. Ordering Capitaines de frégate (lieutenant-commanders) to Sea.

Heretofore a captain had the privilege of selecting his executive officer (capitaine de frégate). A recent decree decided that in the future flag officers may select members of their personal staff from a general list of sea duty kept at the Department in Paris, such selection being subject to the approbation of the Minister of Marine. From the above provision are excepted capitaines de frégate detailed on board the school-ships Borda, Ephigénie, Couronne, Algésiras, Battalion of Fusileers and School of Naval Engineers (mécaniciens de la marine). The decree has been diversely commented upon in the Navy.

No. 50, DECEMBER 14. The Superior School of War in the Navy.

No. 51, DECEMBER 21. Naval Engineers (officiers mécaniciens).

No. 52, DECEMBER 28. The Fournier Cruiser.

Under the title, "La Flotte Nécessaire," Adm. Fournier has published a very interesting work, treating as it does of questions that are most vital to the Navy.

No. 1, JANUARY 4, 1896. Official Publications of the Navy.

The French Minister of Marine, M. Lockroy, has just addressed a circular to all the navy-yards touching the advisability of creating an official publication to be called the "Revue Maritime de l'Etranger," resembling very much our own Bureau of Intelligence's publications.

No. 2, JANUARY 11. The Superior School of War Afloat.

No. 4, JANUARY 25. Apropos of the Estafettes.

This is the new name by which are designated the high-speeded crafts that are to keep open communication between the scouts (Eclaireurs) and the main body of the squadron.

Nos. 5, 6, &c. Homogeneity of the Fleet. English Private Ship-yards in 1895. Speed of Torpedo-boats.

No. 9, FEBRUARY 29. Down with the Superstructures.

No. 10, MARCH 7. On the Means of Lessening the Consequences of Collisions at Sea. J. L.

#### RIVISTA MARITTIMA.

DECEMBER, 1895. The Auxiliary Navy. Study of a Diagram of the Structural Strength, Stability and Trim of Ships. 20 Years of the History of the Sicily Neapolitan Navy. The Mediterranean Military Situation. The Prorogation of the Law of the Mercantile Navy. On the Solution of the Ballistic Problem (supplement to the note published in the August-September number).



## SUMMARY.

Balance of cash unexpended for year 1894 . . . . .	\$4815 78
Total receipts for 1895 . . . . .	4019 28
Total available cash, 1895 . . . . .	<u>\$8835 06</u>
Total expenditures for 1895 . . . . .	4411 07
Cash unexpended January 1, 1896 . . . . .	<u>\$4423 99</u>
Cash held to credit of reserve fund. . . . .	79 89
True balance on hand January 1, 1896 . . . . .	<u>\$4344 10</u>
Bills receivable for dues 1895 . . . . .	714 00
“ “ “ back dues . . . . .	999 83
“ “ “ binding . . . . .	36 20
“ “ “ subscriptions . . . . .	86 75
“ “ “ sales . . . . .	19 07
Value of back numbers (estimated) . . . . .	2000 00
“ “ Institute property . . . . .	100 00
Total assets . . . . .	<u>\$8299 95</u>

The liabilities of the Institute consisted on January 1st of the bill for printing No. 76, which had not been delivered on that date.

## RESERVE FUND.

United States 4 per cent. Consols, registered . . . . .	\$900 00
District of Columbia 3.65 per cent. registered bonds . . . . .	2000 00
Coupon bonds . . . . .	550 00
	<u>\$3450 00</u>
Cash in bank uninvested . . . . .	79 89
Total Reserve Fund . . . . .	<u>\$3529 89</u>
Number of new life members . . . . .	1

## MEMBERSHIP.

The membership of the Institute to date, January 1, 1896, is as follows: Honorary members, 6; life members, 105; regular members, 589; associate members, 191; total number of members, 891.

During the year 1895 the Institute lost by death, resignations, and dropped, 40 members. 52 new members' names were added to the rolls—46 regular, 6 associate; 1 regular member became a life member.

## MEMBERS DECEASED SINCE JANUARY 1, 1895.

## LIFE MEMBERS.

Allen, R. W., Pay Inspector, U. S. N., November 6, 1895.  
 Centre, Robert, April 16, 1895.  
 da Gama, L. F. Saldanha, Admiral, Brazilian Navy, June, 1895.  
 Lyeth, C. H., Lieutenant, U. S. N., March 8, 1895.  
 Slack, W. H., October, 1895.

## REGULAR MEMBERS.

Almy, J. J., Rear-Admiral, U. S. N., May 16, 1895.  
 Gilman, A. H., Pay Director, U. S. N., May 21, 1895.  
 Gorgas, A. C., Medical Director, U. S. N., June 29, 1895.  
 Elder, E. A., December 4, 1895.  
 Poe, C. C., May 18, 1895.

## ASSOCIATE MEMBERS.

Dagron, J. G., 1895.  
 Morgan, C. Leslie, May, 1895.

The Institute had on hand at the end of the year the following copies of back numbers of its Proceedings:

Whole No.	Plain.	Bound.	Whole No.	Plain.	Bound.
1	107	.....	39	237	.....1
2	244	.....	40	37	.....115
3	57	.....	41	261	.....19
4	145	.....	42	110	.....19
5	120	.....	43	160	.....3
6	2	.....	44	62	.....10
7	4	.....	45	43	.....19
8	33	.....	46	51	.....19
9	37	.....	47	33	.....19
11	213	.....	48	52	.....18
12	53	.....	49	20	.....17
13	2	.....	50	64	.....17
14	4	.....	51	37	.....18
15	.....	.....	52	57	.....16
16	228	.....	53	160	.....34
17	1	.....	54	5	.....4
18	107	.....	55	57	.....17
19	111	.....	56	514	.....55
20	128	1	57	23	.....20
21	224	1	58	5	.....7
22	269	1	59	19	.....9
23	179	1	60	1	.....1
24	189	1	61	192	.....18
25	1099	43	62	152	.....16
26	214	90	63	235	.....30
27	302	27	64	36	.....18
28	4	15	65	129	.....18
29	210	9	66	10	.....16
30	249	4	67	14	.....15
31	40	53	68	203	.....9
32	19	173	69	207	.....16
33	12	162	70	217	.....18
34	2	.....	71	226	.....16
35	141	5	72	239	.....19
36	280	29	73	233	.....19
37	202	24	74	236	.....19
38	250	1	75	230	.....19

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Very respectfully,

J. H. GLENNON,

*Lieutenant, U. S. Navy, Secretary and Treasurer.*





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Lieutenant H. G. DRESEL, U. S. Navy (ex-officio).

\*Lieutenant J. H. Glennon, U. S. N., tendered his resignation as Secretary and Treasurer on February 12, 1896. The Board of Control elected Lieut. H. G. Dresel, U. S. N., as Secretary and Treasurer, and elected Commander Edwin White, U. S. N., as a member of the Board of Control.



## *SPECIAL NOTICE.*

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### NAVAL INSTITUTE PRIZE ESSAY, 1897.

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A prize of one hundred dollars, with a gold medal, is offered by the Naval Institute for the best essay presented on any subject pertaining to the naval profession, subject to the following rules:

1. The award for the prize shall be made by the Board of Control, voting by ballot and without knowledge of the names of the competitors.

2. Each competitor to send his essay in a sealed envelope to the Secretary and Treasurer on or before January 1, 1897. The name of the writer shall not be given in this envelope, but instead thereof a motto. Accompanying the essay a separate sealed envelope will be sent to the Secretary and Treasurer, with the motto on the outside and writer's name and motto inside. This envelope is not to be opened until after the decision of the Board.

3. The successful essay to be published in the Proceedings of the Institute; and the essays of other competitors, receiving honorable mention, to be published also, at the discretion of the Board of Control; and no change shall be made in the text of any competitive essay, published in the Proceedings of the Institute, after it leaves the hands of the Board.

4. Any essay not having received honorable mention, may be published also, at the discretion of the Board of Control, but only with the consent of the author.

5. The essay is limited to fifty (50) printed pages of the Proceedings of the Institute.

6. All essays submitted must be either type-written or copied in a clear and legible hand.

7. The successful competitor will be made a Life Member of the Institute.

8. In the event of the Prize being awarded to the winner of a previous year, a gold clasp, suitably engraved, will be given in lieu of a gold medal.

By direction of the Board of Control.

H. G. DRESEL,

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ANNAPOLIS, MD., *February 12, 1896.*

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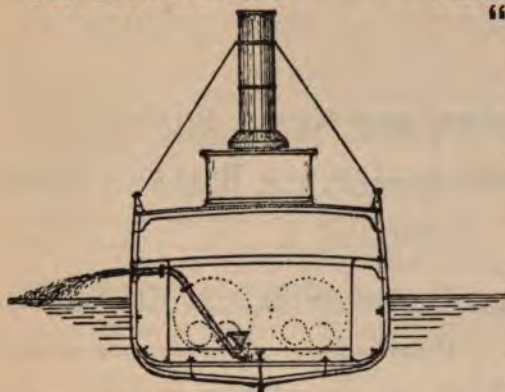
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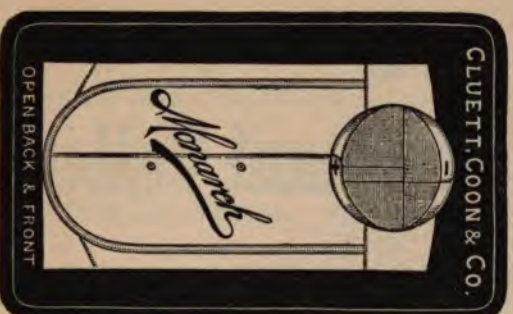
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## NOTICE.

The U. S. Naval Institute was established in 1873, having for its object the advancement of professional and scientific knowledge in the Navy. It now enters upon its twenty-third year of existence, trusting as heretofore for its support to the officers and friends of the Navy. The members of the Board of Control cordially invite the co-operation and aid of their brother officers and others interested in the Navy, in furtherance of the aims of the Institute, by the contribution of papers and communications upon subjects of interest to the naval profession, as well as by personal support and influence.

On the subject of membership the Constitution reads as follows:

### ARTICLE VII.

Sec. 1. The Institute shall consist of regular, life, honorary and associate members.

Sec. 2. Officers of the Navy, Marine Corps, and all civil officers attached to the Naval Service, shall be entitled to become regular or life members, without ballot, on payment of dues or fee to the Secretary and Treasurer, or to the Corresponding Secretary of a Branch. Members who resign from the Navy subsequent to joining the Institute will be regarded as belonging to the class described in this Section.

Sec. 3. The Prize Essayist of each year shall be a life member without payment of fee.

Sec. 4. Honorary members shall be selected from distinguished Naval and Military Officers, and from eminent men of learning in civil life. The Secretary of the Navy shall be, *ex officio*, an honorary member. Their number shall not exceed thirty (30). Nominations for honorary members must be favorably reported by the Board of Control, and a vote equal to one-half the number of regular and life members, given by proxy or presence, shall be cast, a majority electing.

Sec. 5. Associate members shall be elected from officers of the Army, Revenue Marine, foreign officers of the Naval and Military professions, and from persons in civil life who may be interested in the purposes of the Institute.

Sec. 6. Those entitled to become associate members may be elected life members, provided that the number not officially connected with the Navy and Marine Corps shall not at any time exceed one hundred (100).

Sec. 7. Associate members and life members, other than those entitled to regular membership, shall be elected as follows: Nominations shall be made in writing to the Secretary and Treasurer, with the name of the member making them, and such nominations shall be submitted to the Board of Control, and, if their report be favorable, the Secretary and Treasurer shall make known the result at the next meeting of the Institute, and a vote shall then be taken, a majority of votes cast by members present electing.

The Proceedings are published quarterly, and may be obtained by non-members upon application to the Secretary and Treasurer at Annapolis, Md. Inventors of articles connected with the naval profession will be afforded an opportunity of exhibiting and explaining their inventions. A description of such inventions as may be deemed by the Board of Control of use to the service will be published in the Proceedings.

Single copies of the Proceedings, \$1.00. Back numbers and complete sets can be obtained by applying to the Secretary and Treasurer, Annapolis, Md.

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All letters should be addressed to Secretary and Treasurer, U. S. Naval Institute, Annapolis, Md., and all checks, drafts and money orders should be made payable to his order, without using the name of that officer.

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